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FY97 WASTE MINIMIZATION PROGRAM PLAN - APP-243-96

Action: None

Enclosed is the FY97 Waste Minimization Program Plan. Included in this report is the Waste Minimization Program Evaluation and the 1995 Annual Report on Waste Generation and Waste Minimization Progress.

This plan satisfies the requirement for activity #13201-1004 and Part XI of the Site RCRA Operating Permit. If you have any questions about this report, please contact Vicki Scott at extension 7735.

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# **FY97 Waste Minimization Program Plan**

Prepared for:

U. S. Department of Energy  
Rocky Flats Field Office

Prepared by:

Rocky Flats Environmental Technology Site  
Hazardous Waste Projects  
Rocky Mountain Remediation Services  
September 19, 1996

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## FORWARD

The Department of Energy has entrusted Kaiser-Hill and its subcontractors to operate the Rocky Flats Environmental Technology Site (Site). A waste minimization program at Rocky Flats is an important link to providing increased protection of public health and the environment. Waste minimization focuses on reducing the amounts and toxicity of waste materials generated from any process or other site activity, and reusing, recycling, or reclaiming waste materials for future use and benefit. An effective waste minimization program yields numerous advantages including: (1) reduced waste management and regulatory compliance costs, (2) reduced raw material usage, (3) reduced waste inventories and releases of hazardous chemicals, (4) increased worker safety, and (5) reduced civil and criminal liabilities under environmental laws. The primary goal of the Rocky Flats Waste Minimization Program is to reduce all forms of waste and environmental pollutants to the lowest levels practicable.

Throughout the 1980s, the United States became increasingly aware of the environmental damage and restoration costs associated with past improper disposal of hazardous wastes. In the 1984 Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA), Congress declared it is:

... the national policy of the United States that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated, should be treated, stored, or disposed of so as to minimize present and future threat to human health and the environment.

From HSWA, Congress clearly intended a hierarchy of actions for managing the nation's waste problems, with priority given to reduction or elimination of waste over treatment, storage, and disposal of waste after it has been generated.

The Pollution Prevention Act of 1990 expanded this concept to include all forms of environmental pollution. This statute calls pollution prevention a "National Objective" and establishes a hierarchy of environmental protection priorities as national policy, whereby (1) pollution should be prevented or reduced at the source whenever feasible, and (2) where pollution cannot be prevented, waste should be recycled in an environmentally safe manner. In the absence of feasible prevention and recycling opportunities, pollution should be treated; the option of disposal should be used only as a last resort.

The Rocky Flats Waste Minimization Program includes an effort to educate site employees about the concepts of pollution prevention. Through training, employee recognition, and special awareness campaigns, employees are encouraged to foster a pollution prevention ethic both at home and in their work place.

**WASTE MINIMIZATION PROGRAM PLAN  
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## **1.0 INTRODUCTION**

### **1.1 Background**

In January 1988, the U.S. Department of Energy (DOE) established a formal Waste Minimization (WMin) Program at the Rocky Flats Environmental Technology Site (Site). The DOE Rocky Flats Field Office (DOE/RFFO) appointed a full-time WMin Coordinator to oversee and guide the program. Additionally, a WMin organization was established at the Site. The organization included a program manager, dedicated personnel, and an operating budget to develop the program and implement waste minimization projects.

Since that time, DOE has taken several steps to implement a DOE-wide waste minimization and pollution prevention program. The first step in the phased approach occurred in June 1990 when DOE issued a Waste Reduction Policy Statement. This statement directed all DOE program offices and field organizations to institute a waste reduction policy "to reduce the total amount of waste that is generated and disposed of by DOE operating facilities through waste minimization [source reduction and recycling] and waste treatment." A DOE-wide planning structure for executing all DOE waste minimization activities was developed in May 1992 and outlined in the DOE Waste Minimization/Pollution Prevention Crosscut Plan and expanded upon in the 1995 Crosscut Plan. The Plan reaffirmed DOE's commitment to expand the use of waste minimization technologies, processes, and methods in DOE operations and to assist United States business and industry with waste minimization efforts.

### **1.2 Compliance Activities**

The fiscal year 1996 (FY96) Waste Minimization Program Plan (WMPP) is a revision to prior program planning documents developed pursuant to the Rocky Flats Resource Conservation and Recovery Act (RCRA) Operating Permit issued by the State of Colorado.

The Rocky Flats WMin Program is mandated by Federal and State regulations and DOE Orders. A summary of the regulatory requirements applicable to waste minimization is provided in Appendix II; Federal, State, and DOE Waste Minimization Requirements.

Rocky Flats WMin Program activities are proposed, in part, to satisfy EPA and CDPHE regulations for waste minimization (40 Code of Federal Regulations [CFR] 262.41 and 262, Appendix and 6 Colorado Code of Regulations [CCR] 1007-3, Section 262.41 and 262 Appendix). In addition, the program fulfills the waste minimization requirements set forth in DOE Orders 5400.1, General Environmental Protection Program; 5820.2A, Radioactive Waste Management; and 5400.3, Hazardous and Radioactive Mixed Waste Program; and in Executive Orders 12856, Federal Compliance and Community Right-To-Know Laws and Pollution Prevention Requirements; and Executive Order 12873, Federal Acquisition, Recycling, and Waste Prevention.

Revisions to the Rocky Flats WMPP are written in accordance with DOE Order 5400.1 and submitted to CDPHE as a RCRA Operating Permit requirement pursuant to the Hazardous and Solid Waste Amendments (HSWA) requirements in Part XI of RCRA Permit No. 91-09-30-01, issued by the State of Colorado.

### **1.3 Purpose and Scope**

The WMPP establishes the organizational framework and scope of the WMin Program at the Site. The activities and methods described in this plan present a formal approach for reducing the quantity and toxicity of waste materials generated by site operations. This Plan defines the waste minimization and pollution prevention strategy at Rocky Flats.

The WMin Program places preference on the reduction or elimination of hazardous substances, pollutants, waste, and other contaminants at the source through process modifications or changes in process materials. Waste materials that cannot be eliminated from generation will be recycled (i.e., used, reused, or reclaimed) where feasible. In addition, the WMin Program will continue its efforts to assist the Site in operating more efficiently with less risk to human health and the environment through resource conservation and the increased use of recycled materials. The program includes identification of waste treatment techniques used to prepare material for recycling, but does not include treatment to prepare waste for disposal (i. e. compaction and incineration). Waste treatment is not formally recognized within the EPA definition of waste minimization but is considered a waste reduction technique in DOE Headquarters (DOE-HQ) policy statements.

This Plan is intended as a reference tool and guidance document for all government and contractor employees working at the Site. It applies to all Rocky Flats activities that, as a result of the work performed, generate waste materials.

The WMPP is updated annually to satisfy the planning and reporting requirements of DOE Order 5400.1 and the RCRA Operating Permit. The next update of this plan will be published on or before September 30, 1997.

### **1.4 Site Description**

The Rocky Flats Site occupies an area covering 6,550 acres (2,650 hectares) in northern Jefferson County, Colorado, approximately 16 miles (26 kilometers) northwest of Denver. The former production buildings are located near the center of the facility within a security area of 384 acres (155 hectares). The remaining site area is occupied by limited support facilities and serves as a buffer zone for the main production areas.

Site operations generate solid, liquid, and gaseous waste streams. Waste categories at the Site include the following:

- Radioactive waste, which includes transuranic (TRU) waste and low-level radioactive waste (LLW)
- Radioactive mixed waste (TRM and LLM)
- Hazardous waste
- Nonhazardous solid waste
- Recyclable materials

Process wastewater from production, laboratory, and support buildings is treated in one or more wastewater treatment facilities onsite, and the residual sludges are immobilized as a solid waste form. The site's sanitary wastewater is treated in the Wastewater Treatment Plant (WWTP) and discharged to a local creek under a National Pollutant Discharge Elimination System Permit. In addition, Rocky Flats formerly recovered plutonium residues (both mixed and non-mixed) from waste materials for the purpose of being processed for plutonium recovery. These plutonium residues are currently being stored at the site in preparation for future processing.

Approximately 2 million people live within a 50-mile (80-kilometer) radius of Rocky Flats. Adjacent land use consists of a mixture of agriculture, open space, industrial, and low-density residential housing. The climate at the Site is characterized by dry, cool winters and warm summers. Elevation and major topographic features significantly influence the climate and meteorological characteristics of the site. Winds, although variable, are predominately northwesterly. Annual precipitation averages slightly more than 15 inches (38.1 centimeters), with more than 80 percent occurring between April and September. Maximum and minimum temperatures average 76 degrees Fahrenheit (23.3 degrees Celsius) and 22 degrees Fahrenheit (-5.6 degrees Celsius), respectively.

### **1.5 Rocky Flats Environmental Technology Site Transition**

The Rocky Flats mission since the 1950s had been the production of both nuclear and non-nuclear components. In February 1992, global political changes made it possible for the President of the United States to cancel the Rocky Flats nuclear production mission. Cancellation of non-nuclear production activities had been announced previously in an effort to consolidate DOE weapons component manufacturing facilities. As production activities were scheduled to cease, DOE initiated a planning effort for stabilization of Rocky Flats that included opportunities for alternative uses of site facilities, technology, and the work force. The plan, entitled the Mission Transition Program Management Plan, was submitted to Congress in July 1992. In 1994, DOE, RFFO issued the Rocky Flats Draft Strategic Plan detailing the Site objectives.



During fiscal year 1995 the Site underwent significant restructuring. On July 1, 1995 EG&G relinquished responsibilities for operations of the Site and the Kaiser-Hill Team assumed responsibility. The Team includes Kaiser-Hill as the integrating management contractor and four primary subcontractors; Rocky Mountain Remediation Services (RMRS), Safe Sites of Colorado (SSOC), DynCorp of Colorado Inc. (DynCorp) and Wackenhut Services (WSI).

Major activities planned for the coming years include plutonium stabilization and consolidation, planning for decontamination and decommissioning of the Rocky Flats facilities, and continuing to reduce the site population through workforce restructuring programs.

Rocky Flats is part of the National Conversion Pilot Project. This project involves leasing Rocky Flats buildings to Manufacturing Sciences Corp. (MSC) to manufacture waste containers. Phase II of the project was approved during 1995. The Interim Measure/Interim Remedial Action was approved and MSC began cleanup activities, declassification of materials and tools and preparation for Stage III in Buildings 444, 447, 883, and 865.

As a result of the change in Rocky Flats' mission, the WMin Program has shifted its focus from production process modifications to waste minimization techniques applicable to residue elimination, environmental restoration, building stabilization, and decontamination. These activities will be in a constant state of evolution due to continuing budgetary constraints, as new technologies are developed, and as transition plans and objectives change during upcoming years. Consequently, WMin Program objectives will also evolve to keep abreast with changing transition objectives. Many of the program's activities in recent years have concentrated on commercially available decontamination technologies that minimize waste generation during the transition process. The DOE has placed a greater emphasis on Pollution Prevention Opportunity Assessments (PPOA) and WMin Programs will continue to perform assessments during FY97.

## **2.0 WASTE MINIMIZATION AND POLLUTION PREVENTION POLICY**

### **2.1 DOE Waste Minimization Policy Statement**

The DOE, 1995 HQ Waste Minimization/Pollution Prevention Crosscut Plan includes a Pollution Prevention Strategy policy statement issued by Secretary of Energy, Hazel O'Leary:

"The Department of Energy (DOE) embraces pollution prevention as its strategy to reduce the generation of all waste streams and thus minimize the impact of departmental operations on the environment, as well as improving safety of operations and energy efficiencies. I expect the Department to continue the leadership shown by our voluntary compliance with the Emergency Planning and Community Right-to-Know Act (EPCRA) and our participation in the Environmental Protection Agency's 33/50 program which focuses on near-term pollution prevention efforts of 17 priority toxic chemicals."

The Crosscut plan establishes a Department-wide goal to reduce total releases of toxic chemicals to the environment and offsite transfers of such toxic chemicals by 50 percent by December 31, 1999. This plan was written in response to President Clinton's Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," requiring Federal agencies to develop voluntary goals to reduce total releases of toxic chemicals by 50 percent by December 31, 1999. The DOE plan specifies that each site meet the threshold quantities of toxic chemicals established in the Emergency Planning and Community Right-to-Know Act (EPCRA). In addition, each DOE site will establish site-specific goals to reduce generation of hazardous, radioactive, radioactive mixed, and sanitary wastes and pollutants, as applicable.

The purpose of the DOE Crosscut plan is to establish the strategic framework for integrating Waste Minimization/Pollution Prevention (WMin/PP) into all DOE internal activities. This program includes setting DOE policy and goals for reducing the generation of wastes and pollutants, increasing recycling activities, and establishing an infrastructure to achieve and measure the goals throughout the DOE complex.

The DOE WMin/PP mission is to minimize the generation and release of pollutants by implementing cost-effective waste minimization and pollution prevention technologies, practices, and policies with partners in government and industry while conducting the Department's operations in such a way as to minimize impact on the environment, improve the safety of operations and energy efficiency and promote the sustainable use of natural resources.

The focus of the DOE Crosscut plan has primarily been on source reduction and recycling of solid wastes to reduce the amount of waste requiring treatment, storage, and disposal. However, DOE is expanding its efforts to operate more efficiently with less risk to human health and the environment through resource conservation and to reduce environmental releases, and increase use of recycled materials.

## **2.2 Site Waste Minimization Policy Statement**

Through the implementation of the WMPP, Rocky Flats demonstrates site commitment to waste minimization and pollution prevention. The Rocky Flats Kaiser-Hill Management Team is dedicated to minimizing waste generation by giving preference to source reduction, material substitution, and environmentally sound recycling practices over treatment and disposal of waste. The appropriate actions will be taken by the Kaiser-Hill Management Team to provide adequate personnel, budget, training, and material on a continuing basis to ensure the objectives of the Waste Minimization Program Plan are achieved.

In accordance with DOE Order 5400.1 and the Site RCRA Permit, Rocky Flats has issued a written policy for waste minimization. Policy 9-16, Rocky Flats Waste Minimization (Pollution Prevention), defines the scope of the waste minimization effort for the Site. Policy 9-16 is presented in Appendix I of this plan. The policy states that reduction or elimination of waste, discharges, and other forms of emissions shall be minimized in support of commitment to the health and safety of the workforce, the general public, and the natural integrity of the environment. The policy applies to all personnel working at the Site and that waste minimization and pollution prevention are the responsibilities of all employees at the Site.

## **2.3 Additional Waste Minimization Related Policies**

In addition to the Site policy, other policies supporting waste minimization and pollution prevention are summarized below:

- EG&G Rocky Flats, Inc., Policy 10-12, RCRA Regulated Material Procurement Control places certain restrictions on procurement of RCRA regulated materials. Approval signatures are required on Purchase Requisitions, Material and Supply requests (warehouse stock items), and Material Requisitions when purchasing RCRA regulated items. Restricted use of RCRA regulated materials facilitates compliance with regulatory requirements, achievement of waste minimization goals, and an increase in work place safety.
- EG&G Rocky Flats, Inc., Policy 6-9, Radioactive Waste Management emphasizes safe processing and packaging of waste materials. It specifies procedures for waste processing and packaging activities as well as requirements for these activities to be in full compliance with applicable laws and regulations. Policy 6-9 places responsibility on supervisors to continually review their operations to minimize or eliminate generation of radioactive waste.

### 3.0 PAST WASTE MINIMIZATION ACCOMPLISHMENTS

In January 1988, Rocky Flats established a WMin Program Office to oversee the planning and implementation of waste minimization activities. The office was founded on many efforts already initiated by management and by employees through the New Ideas Program. Site waste generation has been declining over the last several years in all principal waste categories. This is partially accredited to the curtailment of plutonium operations and represents increased employee awareness and participation in the WMin Program. Since 1990, site activities have focused on continued production of non-nuclear components; resumption of operations in Buildings 559 and 707, including extensive maintenance and repairs in these buildings; and clean out of plutonium accumulations in ventilation ducts. Major accomplishments of the Rocky Flats WMin Program, since its inception, are highlighted below.

- A major effort to eliminate halogenated solvent usage was initiated in 1987. By 1990, 90 percent of the Freon and 1,1,1 trichloroethane used in nonplutonium manufacturing areas was eliminated. In plutonium manufacturing areas, 30% and 60% reductions in carbon tetrachloride and trichloroethane, respectively, were also achieved.
- The WMin Program has aggressively pursued technologies minimizing waste generation from the eventual decontamination and decommissioning of Rocky Flats facilities. The WMin Program has focused on commercially available technologies adapting them to meet Rocky Flat's applications and requirements. Among these include:
  - The use of carbon dioxide (CO<sub>2</sub>) pellet blasting to clean and recycle plutonium and uranium contaminated scrap metals. Pilot operations with the CO<sub>2</sub> pellet-blast process involving both uranium and plutonium contaminated metals were successfully demonstrated during 1994 and 1995. In addition, WMin spearheaded technology development to allow attachment of a vacuum to the CO<sub>2</sub> pellet gun to facilitate collection of particles without the need of an enclosed area.
  - The testing and procurement of the Kelly Decontamination System to replace the large amounts of combustible waste typically generated during a cleanup operation.
  - WMin procured and evaluated the Dustless Decontamination System (DDS) in FY93. This system uses a piston-type concrete scrabbler, a hand-held needle gun, and a high-velocity, high-capacity vacuum system. The system is designed to remove a layer of contaminated substrate without the creation of dust or airborne contamination and without the use of chemicals or other materials, resulting in the generation of a secondary waste stream.

- Training modules reminding employees of the importance of waste minimization have been incorporated into the General Employee Training (GET) class, the Radioactive Waste Generator training course, the RCRA computer-based training class, and the recently developed Waste Characterization training class. The WMin Program staff has sponsored waste minimization slogan and logo contests and presented special waste minimization hot/cold mugs to employees attending awareness briefings. Recycling and other environmental awareness displays are set up each year to commemorate Earth Day. FY94 witnessed the first issue of a WMin Newsletter to inform employees of waste minimization activities onsite and practices that can be applied at home. Finally, the WMin Program has actively promoted the site's waste minimization accomplishments through poster sessions and presentations at local and national waste management meetings and conferences, and through the Site's award program.
- Rocky Flats has established active recycling programs for many waste streams common to industrial facilities. These include office paper, cardboard, used aluminum cans, scrap metals, batteries, printer toner cartridges, used oils, photographic wastes, and other surplus chemicals and materials. Current records indicate that Rocky Flats recycles approximately 20 percent of the total sanitary waste stream. In April 1993, Rocky Flats received an award from the DOE-HQ Office of Environmental Restoration and Waste Management (DOE-EM) in recognition of the site's achievements in recycling.
- In 1993, Rocky Flats established a Stratospheric Ozone Protection Program under the management of EG&G's Air Quality Division implementing the requirements of Title VI of the Clean Air Act (CAA). Fifty two refrigerant reclamation systems were purchased to establish recycling capabilities for the site's diverse air conditioning and refrigeration systems. Rocky Flats installed highly efficient secondary oil filters, known as bypass filters, on several large chiller units to reduce the frequency of required oil changes and to limit freon releases during the oil change process.
- In 1992, the WMin Program launched an effort to reduce the volume of water based metalworking fluids being disposed of as waste. Through a successful pilot project, machine coolant waste was eliminated from Building 444 Precision Tool Manufacturing Shop.
- In April 1993, the Rocky Flats WMin Program received the 1992 Colorado Center for Environmental Management Certificate of Achievement for success in "zero waste" coolant management.
- In October 1994, the Site received the EG&G Inc's Waste Reduction Pays Award for successfully recycling Granular Activated Carbon.

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- In December 1994 the WMin Program successfully sold to a commercial vendor approximately 925 pounds of silver returning \$50,000 to the Site. This was the first time the Site had participated in such a transaction, opening the doors for potential future 'sell-offs' of precious metals on Site.
- During FY95, 1042 containers of excess chemicals were processed through the Chemical Exchange Program, preventing them from becoming waste.
- During FY95, a Composting Pilot project was completed involving sewage sludge from the Sanitary Treatment Plant. Sludge is crated and shipped to Hanford for disposal as low-level waste. The Pilot project demonstrated that composting reduced the volume of sludge by approximately 18%, and as much as 40% with additional modifications to the system.
- During FY95, Pollution Prevention Opportunity Assessments (PPOA) were completed on 4 different waste streams including: Laboratories 123 and 881, Operable Unit 1, Building 566 Laundry Facilities and Building 566 Laundry Waste Water. The PPOAs for the 123 Laboratory and the Building 566 Laundry Facility successfully reduced the size of the Radioactive Materials Management Areas; thereby, reducing the quantity of low-level waste generated.
- During FY96 a contract for the recovery of metals from circuit boards and various electronic components was established. The contract allows for shipment of materials to a reclamation facility for processing. The value of the precious metals recovered offsets the cost of the contract. Recycling these materials reduces the amount of RCRA hazardous waste at the Site.
- During FY96 a charge back system was developed forcing the cost of waste management onto the generators. The system was successfully tested on limited population of waste containers.
- During FY96 fluorescent lighting tubes containing levels of mercury below the RCRA regulatory limit were identified and evaluated. These tubes are manufactured utilizing a new technology which reduces mercury loss. Procurement information was distributed and facilities have started to utilize them.
- During FY96, a Pollution Prevention Opportunity Assessment (PPOA) evaluating thirty-six of the 122 satellite accumulation areas was performed. Upon implementation of the recommendations of the assessment, 26 satellite accumulation areas may be deleted, the toxicity of two waste stream may be reduced, and only 8 satellite accumulation areas remain active.

- During FY96, two Site employees were awarded the "EG&G Corporate Waste Reduction Pays Awards for Individual Achievement". The awards were issued for outstanding efforts in the management and disposition of precious metals and for the development of the Site's Waste Management Program.

#### **4.0 OBJECTIVES, GOALS, AND IMPLEMENTATION STRATEGY**

##### **4.1 Program Objectives**

The objectives of the Rocky Flats WMin Program are as follows:

- Maintain current offsite recycling programs consistent with Rocky Flats policies for release of material to the public, and expand the program to include other items determined to be economically practical.
- Reduce or eliminate the generation of waste through raw material substitutions, product reformulation, process modification, material segregation, improved housekeeping, and closed loop recycling to achieve minimal facility impact on the environment.
- Conduct continual assessments of Rocky Flats' operations to identify opportunities for waste minimization and needs for research and development.
- Establish specific waste minimization goals, program performance measures, and an information system to report progress realized toward these goals.
- Develop, demonstrate, and implement new and existing waste minimization technologies consistent with identified site needs.
- Promote a philosophy and work ethic among Rocky Flats employees encouraging protection of the environment and preservation of natural resources while achieving the facility's strategic mission.
- Establish and demonstrate senior and middle management commitment to pollution prevention and waste minimization practices.
- Enhance communication at Rocky Flats on waste minimization objectives, goals, ideas, successes, and lessons learned.
- Collect and exchange waste minimization information at the local and national levels, utilizing technology transfer, outreach, and educational networks.



#### 4.2 Waste Minimization Goals

Establishing source reduction and recycling goals is essential to a successful waste minimization program. DOE-HQ has developed goals providing management with tangible targets and providing the basis for measuring progress.

- In accordance with Executive Order 12856, the Department will reduce its total releases of toxic chemicals to the environment by 50 percent, and reduce off-site transfers of such chemicals for treatment and disposal across the DOE Complex, by December 31, 1999. These reductions will be achieved to the maximum extent practical through source reduction.
- Executive Order 12856 requires that each agency to set solid pollution prevention and recycling goals to be achieved by the end of 1995. The Department made a commitment to reduce by 5 percent the generation of solid waste by the end of 1995 and to maintain this 5 percent reduction through the end of 1999. This goal will be achieved through source reduction of hazardous and sanitary waste.
- The Department set an internal source reduction goal for hazardous waste to support the goal for compliance with Executive Order 12856. The Department will strive to reduce the generation of hazardous waste by 10 percent by the end of 1999. The Site intends to achieve these goals through the source reduction of low-level, mixed low-level, transuranic, and mixed transuranic waste.
- The Department will divert for recycling 25 percent, by weight, of the non-hazardous, non-radioactive waste stream by 1995, and maintain this percentage through the end of 1999. Diverted wastes will be recycled directly by the Department or transferred for recycling to a non-Departmental entity. The Site's recycling goals apply to all DOE wastes, including routine and non-routine wastes generated from weapons dismantlement and environmental restoration.

#### 4.3 Implementation Strategy

An implementation strategy was developed to accomplish the waste minimization goals established by the DOE-HQ. Key elements of the strategy are listed below:

- Develop information systems and appropriate analytical tools to establish baseline waste generation data, measure performance against specific waste reduction goals, and select and prioritize waste minimization alternatives. This element was implemented during FY91 through the use of the Waste and Environmental Management System (WEMS) and data bases maintained by the WMin Program.

- Organize and lead Pollution Prevention Opportunity Assessments (PPOA) on specific waste streams onsite. Waste streams targeted are either one of the top-ten waste generators, a liability reduction activity, a waste identified as being overly expensive to handle or a stream identified through tracking/trending activities. WMin representatives organize working groups with team members familiar with specified waste streams. After the team develops options to most effectively minimize the waste stream the WMin representative issues a report detailing the recommendations. The report is used by the effected organization to justify the funding of high Return-on-Investment (ROI) projects.
- Provide timely engineering, construction, and other technical support for waste minimization projects selected for implementation.
- Transfer technologies among the national laboratories and other potential users in the public sector; publish waste minimization successes; and share operating experiences at the local, regional, and national levels.
- Develop and implement a charge-back program for the recovery of waste costs. The system would make the waste generator financially accountable for the waste they generate; thereby, providing a financial incentive to establish and implement good waste minimization practices and techniques.

#### **4.3.1 Program Evaluation**

The Rocky Flats WMin Program is subject to continuous evaluation of all major programmatic activities. Evaluations are conducted both internally, as part of the Integrating Contractor's assessment programs, and externally by various oversight authorities. From May 1990 through September 1991, Rocky Flats was subject to an audit of DOE waste minimization efforts conducted by the DOE Office of Inspector General. An internal programmatic assessment was conducted by the EG&G Environmental Waste Assessments/Audits Organization in the last quarter of FY93. A program evaluation was conducted by an independent contractor during FY94 and FY95. In FY96 a program evaluation was conducted by the Waste Minimization staff, and is submitted under section 2 of this publication.

## **5.0 ORGANIZATION AND RESPONSIBILITIES**

This section delineates the organizational structure of the Rocky Flats WMin Program and specific responsibilities.

### **5.1 Program Organizational Structure**

The WMin organization is responsible for the overall site-wide implementation of the WMin Program. The WMin Program receives direct guidance and oversight from the integrating management contractor; Kaiser-Hill and from DOE, RFFO. The day-to-day management responsibilities reside within one of the subcontractors; Rocky Mountain Remediation Services (RMRS). Both DOE/RFFO and Kaiser-Hill Team management are involved in key programmatic decisions throughout the budget process. WMin efforts are being performed by numerous subcontractors on floor level operations. Pollution Prevention Opportunity Assessments on specific waste streams require input from personnel at the floor level and involve all the subcontractors.

#### **5.1.1 Program Management**

Program management for the Rocky Flats WMin Program is established within RMRS. The WMin Coordinator provides a central point of control, accountability, and reporting for Rocky Flats waste minimization efforts.

The WMin Coordinator has functional responsibility to:

- Plan, initiate, guide, and monitor waste minimization activities in all sectors of the Site.
- Determine Site needs and priorities for waste minimization.
- Coordinate with the Rocky Flats technology development support organizations to (1) develop, test, and demonstrate new waste minimization technologies and material substitutions for Rocky Flats processes and (2) monitor technology development efforts and plan for implementation of new processes and process modifications.
- Perform technical and economic evaluations of commercially available waste minimization technologies for application in Rocky Flats processes.
- Work directly with waste generators to implement proven and commercially available waste minimization technologies ensuring timely, successful completion of projects.
- Provide budget resources for waste minimization activities and develop or control program schedules.

- Measure site performance of the WMin Program and effectiveness of individual waste minimization projects.
- Prepare and distribute reports and other information on Rocky Flats waste minimization efforts to DOE, Federal and State agencies, and interested public groups.

## **5.2 Organizational Responsibilities**

Consistent with the Secretary of Energy's policy statement of August 20, 1992, waste minimization and pollution prevention awareness, practices, and innovation are the personal responsibilities of each DOE and DOE contractor employee. Additionally, DOE and DOE contractor managers at all levels are accountable for implementing policies, plans, and programs designed to ensure that waste minimization and pollution prevention are viewed and acted upon as high priority elements of all activities under their purview. All Rocky Flats employees are responsible for complying with the Rocky Flats Waste Minimization and Pollution Prevention Policy and implementing waste minimization methods as described in this plan. Ultimately, the success of the Rocky Flats WMin Program will depend on the ability of each employee to practice waste minimization in their own jobs and in their own work place.

Organizational responsibilities for conducting the WMin Program are shared by DOE/RFFO and the Kaiser-Hill Team. Within the Team, day-to-day program operations are directed through a central Program Management Organization. Program staff are responsible for developing and overseeing the implementation of waste minimization projects. Key personnel and other project support functions are matrixed to the program from other Team organizations.

### **5.2.1 DOE Rocky Flats Field Office**

DOE/RFFO maintains overall responsibility and control of the Rocky Flats WMin Program. Program oversight and guidance are provided by the Planning and Integration Division. A Waste Minimization Coordinator serves as the liaison between the DOE-HQ Program Offices and the Kaiser-Hill Team lead.

### **5.2.2 Kaiser-Hill Management Team**

Kaiser-Hill, as the integrating management contractor, is assigned the overall management and project implementation responsibilities for the Site. The other Team members consist of four primary subcontractors; RMRS, SSOC, DynCorp Inc. and Wackenhut Services. In addition, third-tier subcontractors perform a variety of work activities at the Site. RMRS administers and directs the day-to-day WMin program operations. Summarized below are the (sub)contractor responsibilities.

### Kaiser-Hill

Kaiser-Hill is responsible for providing the overall vision, strategy and planning to align the goals of the Rocky Flats with DOE and regulatory imperatives. Kaiser-Hill plans, assigns and manages the work, develop site-wide programs, oversee satisfactory work completion and evaluates the performance of that work. Through Kaiser-Hill, the WMin program receives programmatic direction, and budget authority.

### Management and Supervision

Site managers and supervisors are responsible for reviewing their work areas for opportunities to reduce waste generation and to monitor work in progress to ensure waste minimization practices are followed. Specific waste minimization practices shall be incorporated into Integrated Work Control Program work packages (during the pre work planning process) and technical procedures where practicable. Managers and supervisors shall incorporate waste minimization goals in job performance objectives and in annual employee job performance reviews.

### Program Managers

All Program Managers are responsible for ensuring WMin practices are implemented in order to achieve annual waste minimization goals consistent with the site goals contained in this document.

### Site Employees

All Site employees are responsible for following waste minimization practices and participating in the recycling programs as described in this plan. Employees shall comply with sound waste minimization principles such as maintaining proper waste segregation, avoiding unnecessary radioactive contamination of materials, and decontaminating and reusing materials and equipment whenever practicable.

### Procurement

The Procurement Department is responsible for implementing a preference program favoring the acquisition and use of environmentally preferable products and services. Such a program shall be fashioned to comply with the Federal procurement policies set forth in Section 6002 of RCRA and subsequent regulatory guidelines as well as Executive Order 12873. Procurement is additionally responsible for the annual DOE Affirmative Procurement Report.

Procurement is responsible for ensuring all subcontractors are contractually required to follow waste minimization plans and procedures consistent with those required of management and employees at the Rocky Flats.

## **6.0 WASTE MINIMIZATION PROGRAM DESCRIPTION**

This section presents the key elements of the Rocky Flats WMin Program and descriptions of various waste minimization ongoing activities. It is intended as both guidance and information for all employees at the Site.

### **6.1 Administrative Activities**

#### **6.1.1 Reporting**

Planning and reporting requirements for the WMin Program are defined through DOE Orders, federal and state regulations, and the Rocky Flats RCRA Operating Permit. Throughout the year, the program is engaged in updating plans and reports intended for various audiences. In addition, the WMin Program responds to numerous informal requests for information regarding Rocky Flats waste minimization efforts.

The RCRA Operating Permit and DOE Orders 5400.1 and 5820.2A require preparation of an Annual Waste Reduction Report. The annual progress report describes efforts undertaken to minimize waste at Rocky Flats and actual reduction performance achieved during the previous calendar year. The annual report details achievements in waste minimization at Rocky Flats, including annual volumetric and percentage reduction in waste generation for each major waste stream and the means through which the reduction was achieved (e.g., treatment, source reduction, product substitution). If waste reduction goals are not achieved, an explanation of the circumstances preventing the achievement is provided in the report. The WMin Coordinator has lead responsibility for preparing this document.

DOE-HQ requires an Annual Report on Waste Generation and Waste Minimization Progress. Information from the Rocky Flats report is consolidated into a Complex-wide report on Waste Generation and Waste Minimization Progress and presented to the Secretary of Energy. The WMin Program has lead responsibility for preparing this document.

Descriptions of efforts undertaken during the year to reduce the volume and toxicity of hazardous and mixed wastes are reported biennially in the Hazardous Waste Report submitted to CDPHE. This report is required by the Colorado Hazardous Waste Regulations (6 CCR 1007-3, Sections 262.41 and 264.75) for facilities that generate, treat, store, and/or dispose hazardous waste. This report must include a description of the changes in volume and toxicity of waste actually achieved during the year in comparison with previous years. The report is completed in conjunction with the Annual Waste Reduction Report.

Forms known as Form R's are submitted to EPA and CDPHE each July 1, as required by EPCRA (Superfund Amendments and Reauthorization Act [SARA] Title III). Site chemical inventory

information is used to meet this annual requirement. Beginning in July 1992, Rocky Flats has submitted annual Toxic Chemical Source Reduction and Recycling Reports.

#### **6.1.2 Waste Tracking and Trending**

Waste and Environmental Management System (WEMS) is used to track all waste types (TRU/TRM, LLW/LLM, hazardous, nonradioactive, and nonhazardous) and certain types of RCRA regulated residues (in drums) from "cradle to grave." WEMS tracks active containers with controlled, serialized numbers containing 14 material types. As identified in the RCRA Operating Permit, WEMS is part of the official operating record for RCRA regulated and radioactive waste at Rocky Flats, ensuring all current system capabilities continue and regulatory compliance is maintained.

Currently, WEMS is used to provide automated data validation or analysis for compliance with regulations on storing, inspecting, and transporting waste. Regulatory agencies include DOE, the U.S. Department of Transportation, CDPHE, EPA, the Waste Isolation Pilot Plant, the Nevada Test Site, and many others.

WEMS was converted to ORACLE in FY95. The ORACLE conversion ensures the Site that WEMS will continue to be operated on a software supported by the vendor and for which Rocky Flats has adequate programmer resources. Additionally, WEMS will be used to maintain compliance with Off-site Shipping and Acceptance Criteria, the RCRA Operating Permit, DOE Orders, and several RCRA regulations.

#### **6.1.3 Pollution Prevention Awareness Program**

EPA defines the term "pollution prevention" as the use of processes, practices, or products that reduce or eliminate the generation of pollutants and wastes or that protect natural resources through conservation or more efficient utilization. Although it is closely tied to waste minimization, the concept of pollution prevention involves a more comprehensive approach to worldwide pollution and natural resource problems. The Pollution Prevention Act of 1990 encourages a national policy with emphasis on source reduction (elimination of waste at the point of generation) through better planning and more efficient operations and recycling (recovery and reuse of materials). Pollution prevention also includes toxicity reduction, whereby the waste stream is rendered less toxic either by treatment or through a process change such as substitution of a less toxic chemical for the more toxic chemical originally used. In addition, DOE Order 5400.1 requires Rocky Flats to establish a Pollution Prevention Awareness Program (PPAP).

Because of the close relationship between waste minimization and pollution prevention, the PPAP is incorporated within, and managed as part of, the Rocky Flats WMin Program. The Rocky Flats PPAP focuses on promoting good operating practices among site employees through incentives, education, awareness campaigns, and employee recognition. The DOE/RFFO objective is not to confine pollution prevention awareness to the Site only but to transfer these practices to the employees' personal lives. Elements of the PPAP at Rocky Flats are described below.

### Training

Waste minimization training is provided to Site employees through four separate courses: General Employee Training (GET), repeated every two years; the Waste Generator Training course, repeated every two years; the RCRA Training course, repeated annually; and the Waste Stream and Residue Identification and Characterization (WSRIC) course. All waste minimization modules are periodically reviewed and updated to reflect the current status of the WMin Program. Elements of the WMin training program include the following:

- An explanation of the need for waste minimization and pollution prevention, from both an environmental conscience perspective and a corporate/individual liability perspective
- An explanation of the benefits to be derived from such programs, both at work and in employees' homes
- Examples of current site projects that reduce waste generation, either by changes to process or operating procedures or by recycling
- An overview of the site's waste minimization policy, and the regulations that require a formal waste minimization program
- The need for active participation from all employees in finding solutions to waste problems

### Employee Awards, Incentives, and Awareness Campaigns

The Kaiser-Hill Management Team has initiated a new incentive program for employees at the Site: Earned-Incentives and Cost-Savings Incentives. The Earned-Incentives rewards employees for meeting and exceeding the established Performance Measures. The Cost-Savings Incentives rewards employees for finding ways to reduce the cost of operating the Site. Through these incentive programs, employees are compensated for developing and establishing innovative waste minimization techniques or ideas.



Earth Day recognition has become an important annual event at Rocky Flats. It began in 1991, as an effort to promote employee awareness and participation in waste minimization or pollution prevention activities. In the past, environmental departments set up displays presenting information on their projects. Displays of products made from recycled materials have been brought to the site by the "Complete the Cycle" center of Denver. Brochures and information sheets have been made available to employees, including environmental/recycling information applicable at home and at work.

#### Technology and Information Exchange

Opportunities for the exchange of information and technologies are developed through information exchange networks, workshops, and topical conferences. The Rocky Flats WMin Program fosters participation in business, education, and government forums designed to provide technical assistance and as a means to exchange waste minimization information. All WMin Program staff are encouraged to use EPA's Pollution Prevention Information Exchange System and the DOE Waste Information Network.

The PPAP utilizes site publications to disseminate information regarding waste minimization activities. These publications include the site newspaper, Crossroads, and the individual subcontractor newsletters. Immediate release of information occurs via the bulletin boards in each office area (Daily Update) as the need arises. Periodic news releases describing Rocky Flats waste minimization achievements are distributed to the local and national news media. The WMin Program works with the Media Relations Department to draft news releases and conduct interviews with media representatives.

Information on Rocky Flats waste minimization and pollution prevention efforts is also exchanged on the national and local levels at national workshops and conferences and in local forums such as the Colorado Pollution Prevention Partnership. Technology and information exchange also occurs between DOE facilities at annual conferences and other DOE-sponsored workshops.

#### **6.1.5 Waste Management Cost Analysis**

The Volume Basis Waste Management Cost Analysis was originally published in FY92 with an update completed in FY94. This report detailed a study of Rocky Flats waste management costs and satisfied the requirement in the RCRA Operating Permit to "determine total costs of managing the waste." The updated costs in FY94 reflect revised labor rates, material costs, time estimates, waste handling and treatment processes, and shipping and disposal changes. Actual dollars spent during FY93 were used as the basis for measuring the accuracy of estimated costs in the original report. The cost analysis report is a key reference used by the WMin Program when conducting project cost-benefit analyses.

## **6.2 Source Reduction**

### **6.2.1 Pollution Prevention Opportunity Assessments**

A Pollution Prevention Opportunity Assessment (PPOA) is a systematic, planned method with the objective of identifying ways to reduce or eliminate waste. The PPOAs conducted at Rocky Flats use the Allied Signal Inc., Kansas City Division methodology, which is becoming the standard across the DOE complex. Personnel performing the PPOAs are training in accordance with the Pollution Prevention Opportunity Assessment Training developed and sponsored by Allied Signal. This methodology incorporates a total quality approach where opportunities are identified, current practices are analyzed, and desired outcomes are defined. During the PPOA, proposed solutions are identified and prioritized for implementation strategies. WMin determines what activities should be analyzed by using the WEMS to identify large quantity generators, reviewing management costs for the most expensive wastes, and by reviewing those wastes identified as potential liability issues. Floor personnel are involved in the analysis due to their intimate knowledge of the activities and practices on site. Upon completion of the analysis, a report is written detailing various waste minimization recommendations/options and current waste minimization practices. The identified recommendations/options may include complex process changes that may involve capital costs or may be as simple as a material substitution or procedure change. In addition, Return-on-Investment (ROI) forms are completed for the appropriate recommendations/options. The ROIs outline and formally document the costs associated with implementation of the identified recommendations and provide a ready mechanism to obtain additional funding either through the Site or through DOE.

PPOAs have been an integral part of waste minimization activities at Rocky Flats since the WMin Program was first organized. Many PPOAs (formerly called Waste Minimization Assessments or WMAs) have been completed in prior years, but due to lack of adequate resources or changing priorities, several of the recommendations/options have not been implemented. During FY95, a review of all past assessments was completed and a list of those recommendations/options that had not been established developed.

### **6.2.2 Material Changes and Process Equipment Modifications**

Material changes, process parameter adjustments, and modifications to process equipment are one of the most fundamental methods of controlling waste generation at the source. The selection of materials used in a particular process or job may have a significant impact on (1) the amount and type of waste that results, (2) the presence of chemical hazards in the work place, (3) the risk of potential releases to the environment, and (4) the number and types of regulations applicable to the operation. Supervisors and employees are encouraged to examine their work areas to identify potential processes in which nonhazardous or less hazardous materials can be substituted for the hazardous chemicals currently in use. Some examples of past material substitutions are as follows:

- Aqueous cleaners using an alkaline detergent substituted for a halogenated or petroleum-based solvent. Commercial cleaning systems such as automated parts washers and ultrasonic cleaners are available to handle a variety of cleaning applications.
- Non-solvent-based products or media blasting techniques for paint removal can be substituted for solvent-based strippers. Examples include caustic strippers, sand or plastic bead blasting, CO<sub>2</sub> pellet blasting, and thermal or hot air coating removal methods.
- Oil-based cutting fluids replaced with water-soluble fluids. This can eliminate the need for solvents to clean parts and equipment after machining. The majority of metalworking fluid currently used in Rocky Flats non-nuclear manufacturing is water soluble.
- Latex paints are often suitable substitutes for oil-based paints. Rocky Flats began substituting latex paint for oil-based paint in the early 1980s in the majority of architectural painting operations at Rocky Flats.

At Rocky Flats, material substitution is process or job specific. Invariably, numerous considerations must be addressed when selecting a viable alternative. These considerations include the following:

- Will the new material satisfy process or job requirements?
- Will the new material be compatible with all aspects of the process and all materials of construction?
- Will there be any adverse impacts to product quality?
- Will there be interference with subsequent processing or waste treatment operations?
- Will the substitute material pose any new safety or health concerns?
- Will the new material present any waste disposal problems?

The WMin Program, in coordination with the appropriate user and support organizations, thoroughly evaluates these issues before a decision is made to substitute a new material in a process.

Technological changes can also provide significant reductions in waste generation. These changes can take on a variety of forms, including (1) replacement of an existing process with a technologically advanced, more efficient process, (2) replacement of equipment inherently inefficient or does not adequately meet processing requirements, and (3) use of automated

devices and in-line diagnostic equipment to control process efficiencies and make better use of raw materials. Some examples of technological changes are as follows:

- Standard equipment on centrifugal chiller systems replaced with more efficient equipment, resulting in lower chlorofluorocarbon (CFC) emissions. High efficiency purge systems have been installed in several Rocky Flats chiller units to maximize air to refrigerant exhaust ratios. Spring loaded pressure relief valves that automatically reset when over pressure is released have also been installed. State-of-the-art oil filtration systems have been installed to extend the interval between CFC-releasing oil changes.
- Air compressors utilizing oil have been replaced with compressors that operate without. Waste oil and combustible waste generation has been reduced.
- Aerosol paint cans, used in paint booth operations, have been replaced with reusable, cleanable sprayers. The paint booth in Building 333 has been equipped with sprayers, thereby reducing the amount of aerosol can waste.

#### **6.2.3 Changes to Procedures and Operating Practices**

Changes to operating procedures and work practices can produce significant waste minimization results by affecting fundamental methodology. These changes are generally thought of as a group of "common sense" daily work habits. Each functional organization at Rocky Flats has responsibility for examining its operation to determine whether waste can be reduced at the source by changing an operating procedure or establishing an administrative control to govern work practices. Examples of how waste minimization is implemented through these types of controls are as follows:

- Items entering into Radiologically Controlled Areas (RCAs) or Radioactive Material Management Areas (RMMAs) are automatically suspected of being radiologically contaminated. If the object cannot be cost effectively surveyed (e.g., cardboard), it is discarded as LLW. Controlling the entry of unnecessary items (such as packing materials and newspapers) into RCAs and RMMAs reduces the amount of LLW generated. Health and Safety Practices Manual 18.02, Radiological Requirements for Entering and Exiting Areas Controlled for Radiological Purposes, provides Site guidance on items entering and leaving a controlled area.
- Waste streams are kept segregated as much as practical. Listed or characteristically hazardous RCRA wastes are not co-mingled with non-RCRA regulated waste.
- Tools and equipment are decontaminated and reused whenever practical.

- Clean rags are supplied to the Building 331 garage by an offsite vendor. The vendor is also responsible for laundering the used shop rags so they can be reused by garage personnel.
- Used absorbent socks and pillows are wrung out (using a commercially available ringer) and reused up to six times before they lose their capacity to absorb liquids. Liquids (e.g., oils) are collected in a drum and recycled or disposed accordingly. This practice generates less waste over time and eliminates the need to add excessive amounts of granular absorbent material to drums when disposing the absorbent socks.
- Leaking valves, pumps, and other process equipment are repaired promptly or removed from service. Rags, kimwipes, floor-dri, and other absorbent wastes are minimized.

### 6.3 Recycling, Reuse, and Recovery Programs

In the scheme of pollution prevention, recycling or reuse and recovery programs are less desirable than source reduction, but are preferable to direct disposal. Typically, recycling waste materials (or recovering a reusable commodity from a waste stream) requires further physical or chemical processing, which in itself creates waste. This "chain" of waste products is less desirable than not generating the waste in the first place. In some cases, a waste material can be reused "as is" in another process or application, known as source reduction.

Waste reduction at the source may not be practical in all situations or may not be effective in entirely eliminating a source of waste. In these cases, the WMin Program evaluates the feasibility of segregation and collection of materials for recycling. Valuable commodities (e.g., precious metals) are recovered from waste streams in accordance with Federal regulatory guidelines. Reuse of waste materials wherever practical is strongly encouraged. Recycling and recovery programs are, and will be, implemented consistent with opportunities and/or commercial markets for recyclable materials.

Recycling is conducted within Rocky Flats guidelines and procedures established for the release of materials to the general public, as defined in DOE Order 5400.5, Radiation Protection of the Public and the Environment, and 1-16100-HSP-18.10, Release of Property/Waste for Conditional and Unrestricted Use. Rocky Flats recycling programs are governed by 1-B27-REC-001 Rocky Flats Recycling. Recycling and recovery programs have been established at Rocky Flats for office paper, printer toner cartridges, cardboard, scrap metals (stainless steel, copper, aluminum, lead), precious metals, electronic scrap, batteries, tires, oil filters, aluminum cans, and water. Used nonradioactive oils are shipped offsite for fuel blending and subsequent energy recovery.

#### **6.3.1 Paper Recycling Program**

Rocky Flats initiated an office paper recycling program in April 1988 and has since recycled over 3.9 million pounds of paper. The success of the program has extended the operating life of the onsite landfill, reduced disposal costs, and conserved natural resources.

#### **6.3.2 Printer Toner Cartridge Recycling Program**

A printer toner cartridge recycling program was established in March 1993. Since inception 3792 remanufactured cartridges of a total 7103 cartridges sent for recycle have been purchased back from the re-furbishing vendor. Cartridge cases can last through as many as 20 remanufactures, while other parts are replaced as necessary. Remanufactured cartridges are less than half the cost of new cartridges. The WMin Program is working with Procurement and the vendor to promote using only recycled printer toner cartridges.

#### **6.3.3 Cardboard Recycling Program**

The cardboard recycling program is established outside the PA with 40 dumpsters to collect material. It is estimated that cardboard constitutes approximately 25 percent by volume of the trash placed in the sanitary landfill; therefore, this program has significantly decreased the volume of waste sent to the landfill. During calendar year 1995, 71 tons of cardboard was recycled from the site, a 62% increase from the previous year. To support the program a compactor truck was procured to expedite collection.

#### **6.3.4 Scrap Metals**

Scrap metals are segregated at the point of generation according to metal type (lead, copper, aluminum, stainless steel, mild steel, and other nonhazardous metals). The generator completes required paperwork to transfer the metal to the Property Utilization & Disposal storage yard pending shipment to a recycler. Over 176 tons of scrap metal were recycled during the calendar year 1995.

#### **6.3.5 Aluminum Cans**

Recycling of aluminum cans is an employee initiative at Rocky Flats. Individual employees collect aluminum cans in their work areas or in specially designated recycling bins and subsequently remove the cans from site. In many areas, money from the cans is donated to charities. The WMin Program estimates that approximately 24,000 pounds of aluminum cans are recycled from Rocky Flats each year. There are currently 150 recycle bins distributed throughout the site. The bins are stenciled with one of the winning logos from the awareness campaign contest, and the lids have a special "Cans Only" opening. The bins are in cafeterias and beside vending machines around site.

#### **6.3.6 Recycling and Reuse of Excess Chemicals and Materials**

Administrative and inventory controls are used to ensure excess chemical inventories at Rocky Flats are utilized to the maximum extent practicable prior to the purchase of new chemicals. Chemicals declared to be excess will be made available to new chemical purchasers onsite and to potential offsite users through the Chemical Exchange Program. The Chemical Management Committee reviews and approves chemical requisitions based on this excess chemical list. The committee verifies chemicals appearing on the list are utilized to the maximum extent on site rather than purchase new.

#### **6.3.7 Silver Recovery Program**

The primary objective of the silver recovery program is to increase the recovery and recycling of silver from silver-bearing materials used at Rocky Flats. Examples of silver-bearing materials include radiographic film, photographic fixer solution, photographic rinse water, and filter cartridges. Silver recovery and recycle efforts result in reduced generation of hazardous waste and reduced disposal costs. Silver recovery is required by Policy 6-2 in the Rocky Flats Policy Manual and DOE Property Management Regulations 109-42.3.

## **APPENDIX I**

### **Rocky Flats, Waste Minimization Policy (Policy 9 - 16)**



**POLICY 9-16****WASTE MINIMIZATION (POLLUTION PREVENTION)****POLICY**

Reduction or elimination of waste, discharges, and other forms of emissions shall be minimized in support of commitment to the health and safety of the workforce, the general public, and the natural integrity of the environment.

**SCOPE**

This policy applies to all EG&G Rocky Flats, Inc. organizations, employees, and subcontractors who generate waste and environmental pollutants during the performance of work at the Rocky Flats Plant (RFP).

Waste minimization and pollution prevention are the responsibilities of every employee and include, without being limited to, actions such as the following:

- Elimination of unnecessary materials, including personal items, in areas where the presence of, or potential for, contamination may result in needless radioactive waste.
- Participation in approved recycling programs.
- Resource preservation through water and electricity conservation.

Source reduction techniques will be given first priority in the hierarchy of waste minimization and environmental protection practices followed by environmentally sound recycling and treatment of waste and other pollutants to reduce volume, toxicity, and mobility prior to storage and disposal.

Source reduction is accomplished through:

- Process input substitutions
- Product reformulation
- Process modifications and upgrades
- Improved housekeeping
- Closed-loop (in-plant) recycling

Environmentally sound recycling encompasses the use of off-site services to recycle plant materials, provided that the recycling benefits outweigh likely environmental degradation caused by the physical or chemical processes used to reclaim the materials.

This policy supersedes Policy 6-12, Rocky Flats Waste Minimization, dated March 31, 1990.

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## DEFINITIONS

**Pollution Prevention:** A multi-media approach to reduction or elimination of environmentally harmful releases. The EPA Pollution Prevention policy focuses on the prevention of pollution through source reduction and environmentally sound recycling techniques. Term is currently being used in place of "waste minimization" in regulatory jargon.

**Waste Minimization:** Any source elimination, reduction, or recycling activity that results in reduction of the total quantity or toxicity of the waste consistent with the goal of minimizing present and future threats to human health and the environment.

Waste minimization encompasses source reduction and recycling activities in the EPA Resource Conservation and Recovery Act (RCRA) hazardous waste program, but in regulatory jargon, "waste minimization" has been superseded by "pollution prevention" which has applicability beyond the hazardous waste context.

**Waste Reduction:** A Department of Energy (DOE) term for ALL source reduction, recycling, and waste treatment activities.

The DOE "waste reduction" convention, unlike EPA "waste minimization," allows credit for physical or chemical treatment for reduction of waste volume, toxicity, or mobility. For example, DOE considers super compaction a form of waste reduction while the EPA does NOT consider super compaction a form of waste minimization because the mass of the waste is unchanged.

## RESPONSIBILITIES

### Associate General Manager, Environmental and Waste Management

Ensures development of the annual Waste Minimization Program Plan, consistent with federal/state permits, compliance agreements, and other applicable regulatory requirements and DOE directives, and the maintenance of procedures or requirements manuals to guide waste minimization/pollution prevention at RFP.

Ensures development of a formal plan to guide assessment, discovery, evaluation, and implementation of the best, demonstrated, available technologies for waste minimization consistent with the RFP mission.

Guides establishment of annual goals for reduction of volume, mass, or toxicity of RFP waste streams.

Provides annual review of waste minimization effectiveness to formally identify potential areas of improvement.

**RESPONSIBILITIES, Continued**

Establishes and chairs the Waste Minimization Executive Steering Committee to provide senior management with waste minimization awareness, guidance, and direction.

Ensures provision of compliance guidance, monitoring, and evaluation for other Associate General Managers (AGMs) applicable to the scope of this policy.

**Associate General Manager, Engineering and Technology**

Ensures incorporation of waste minimization and pollution prevention principles into the design of new processes and facilities, and into process change and facility modification.

**Associate General Managers**

Ensure process waste assessments are completed within respective areas and operations.

Ensure development of annual waste minimization goals and achievement plans, consistent with the site Waste Minimization Program Plan and goals to include provisions for training employees on organization-specific goals and methods.

**ACTIONS REQUIRED**

**1. Manager, Waste Minimization:**

- A. Establishes and chairs a Waste Minimization Working Group to promote waste generator involvement, improve communications among organizations and employees, and improve overall waste minimization effectiveness.
- B. Ensures waste minimization training development and availability for personnel commensurate with involvement in waste generation.
- C. Conducts waste minimization pre-design review of capital equipment and expense projects (including equipment stripout, decontamination and decommissioning, demolition, and environmental remediation projects).

**2. Procurement:**

- A. Implements a procurement preference in favor of products composed of recovered (recycled) material, wherever practicable.

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### ACTIONS REQUIRED, Continued

- B. Incorporates contractual stipulation, per Waste Minimization guidance, that subcontractors follow RFP waste minimization plans and procedures.
- C. Prepares and submits the required Agency Annual Report on Affirmative Procurement to DOE, Rocky Flats Office (RFO).
- 3. Facilities Project Management ensures that subcontractors implement waste minimization plans and procedures consistent with those of EG&G Rocky Flats, Inc.
- 4. RFP Management and Supervision:
  - A. Constantly review work areas for opportunities to reduce waste generation as part of organizational Self Evaluation. (See 1-11000-ADM-16.10, Self Evaluation Program.)
  - B. Incorporate waste minimization practices/tasks into work control documents, where practicable.
  - C. Identify waste minimization goals in job performance objectives and evaluate employee contribution(s) in performance appraisals, where appropriate to the organizational scope of work.
- 5. Operations and Maintenance Managers, Supervisors, and Foremen:
  - A. Convey waste minimization methods and priorities during pre-evolution briefings.
  - B. Monitor work in progress to ensure utilization of waste minimization during performance of work.
  - C. Ensure maintenance of proper segregation of materials or substances as early as practicable in the waste generation process: radioactive, nonradioactive, RCRA-regulated (mixed and hazardous), and recyclable materials.
  - D. Whenever possible, ensure proper identification of radioactive contaminated material appropriate for decontamination and reuse.

### REFERENCES

Pollution Prevention Act

Resource Conservation Recovery Act (RCRA)

**REFERENCES, Continued**

**10 CFR, Energy**

**40 CFR, Protection of Environment**

**58FR31114, EPA Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program**

**DOE 5400.1, General Environmental Protection Program**

**DOE SECY Memo, Secretary Watkins Memorandum on Waste Minimization and Pollution Prevention, 8/20/92**

**DOE-SEN-37-92, Waste Minimization Crosscut Plan Implementation**

**EPA Pollution Prevention Strategy, February 7, 1991**

**Executive Order 12780, Federal Agency Recycling and the Council on Federal Recycling and Procurement Policy**

**Executive Order 12843, Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances**

**Colorado Department of Health State RCRA Permit Number 91-09-30-01**

**Policy 10-12, RCRA-Regulated Material Procurement Control**

**1-11000-ADM-16.10, Self-Evaluation Program**

APPROVED: \_\_\_\_\_

  
General Manager

## **APPENDIX II**

### **Federal, State and DOE Waste Minimization Requirements**

## Federal, State, and DOE Waste Minimization Requirements

Driver	Law	Effect
Federal Procurement Guidelines	Resource Conservation and Recovery Act (RCRA)	Requires generator to put in place a hazardous waste minimization program
Generator Manifest Certification	RCRA	Requires generator to put in place a hazardous waste minimization program
Generator Biennial Report Certification	RCRA	Requires generator to put in place a hazardous waste minimization program
Part B Permit Conditions	RCRA	Requires generator to put in place a hazardous waste minimization program
Liability Insurance Requirements	RCRA	Generator and facility owners and operators reduce liability
Land Disposal Restrictions	RCRA	Increases the cost of waste management
Exclusion to the Toxicity Characteristic	RCRA	Minimizes chlorofluorocarbon (CFC) venting and encourages recycling
Presidential Executive Order 12856	Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements	Commits Federal agencies to Pollution Prevention through source reduction
Presidential Executive Order 12873	Federal Acquisition, Recycling, and Waste Prevention	Requires Federal agencies to incorporate waste prevention and recycling into acquisition planning
Toxic Release Inventory Reporting	Emergency Planning and Community Right-to-Know Act (EPCRA)	Establish reporting requirements for the use, storage, and onsite and offsite transfers of hazardous and toxic chemicals.

Federal, State, and DOE Waste Minimization Requirements (continued)

Driver	Law	Effect
National Policy	Pollution Prevention Act (PPA)	Declared pollution prevention as the first choice in environmental management
Toxic Release Inventory Reporting	PPA	Expands SARA 313 reporting requirements to include source reduction and recycling information
Increased Reporting Requirements	PPA	Increases public access to information, stimulating citizen enforcement and holds industry to stricter standards
CERCLA Financial Liability	Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	Generators reduce future liability by reducing waste
National Ambient Air Quality Standards	Clean Air Act (CAA)	Promotes cutting emissions of six hazardous air pollutants
New Source Performance Standards	CAA	New plants must conform to strict emission requirements
Phased-In Requirements	CAA	Firms must meet new, more restrictive air emission standards
Early Reductions Program	CAA	Compliance extensions for voluntary early reductions of hazardous air pollutants
Maximum Achievable Control Technology (MACT)	CAA	Directs EPA to consider pollution prevention technologies when selecting MACT
Clean Fuel Fleet Program	CAA	Requirement to meet clean-fuel fleet vehicle emissions standards



Federal, State, and DOE Waste Minimization Requirements (continued)

Driver	Law	Effect
Protection of Stratospheric Ozone	Clean Air Act (CAA)	Phase-out of CFCs, halons, and carbon tetrachloride by 2000; limit on emissions of ozone-depleting substances during the servicing, use and disposal of equipment containing those substances.
Minimization Certification	Clean Water Act (CWA)	Requires a plan for industrial firms to diminish the volume and toxicity of their hazardous discharges
Significant New Use Notification	Toxic Substance Control Act (TSCA)	Makes firms legally responsible to EPA for voluntary waste minimization commitment
Bans on Chemical Substances	TSCA	Eliminates feedstocks responsible for certain waste streams
Handling and Transportation Requirements	Hazardous Material Transportation Act (HMTA)	Safety requirements raise costs of transporting wastes
Handling Requirements	Occupational Safety & Health Act (OSHA)	Safety requirements raise costs of transporting wastes
Environmental Taxes	Revenue Reconciliation Act (RRA)	Taxes on ozone-depleting chemicals
Research and Development Tax Credits	Tax Reform Act (TRA)	Provides for a tax credit for increasing investment in research and development of processes and products that reduce waste
Stormwater Pollution Prevention Plan	CWA	Requires that industrial stormwater discharge facilities have an onsite pollution prevention plan

# **Waste Minimization Program Evaluation**

Prepared for:

U. S. Department of Energy  
Rocky Flats Field Office

Prepared by:

Rocky Flats environmental Technology Site  
Hazardous Waste Projects  
Rocky Mountain Remediation Services  
August 1, 1996

## **Introduction**

The Rocky Flats Environmental Technology Site (Site) is required to respond to many waste minimization requirements set forth by the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), the Colorado Department of Public Health and Environment (CDPHE), and the President of the United States (Executive Orders). The requirement of these authorities are identified in the FY 96 Waste Minimization Program Plan.

The CDPHE, through the Resource Conservation and Recovery Act Operating Permit, Part XI requires that a waste minimization program be evaluated annually. The requirements state that the permittee shall conduct an annual review and assessment of program effectiveness, and use the reviews to provide feedback to program managers and top management to identify potential areas for program improvement. This evaluation is intended to meet those requirements.

The evaluation was conducted in two parts, a Waste Minimization Evaluation Survey, and a program assessment performed by the Waste Minimization Program staff. The Waste Minimization Evaluation Survey was sent to Site employees to assess the awareness levels of the waste minimization program. The assessment was intended to measure the programs progress toward meeting the requirements set forth in the Fiscal Year 96 Waste Minimization Program Plan. This report presents the survey and assessment results and identifies recommendations for future program improvements.

## **Analysis of the Waste Minimization Evaluation Survey**

To achieve an objective evaluation of the waste minimization program from Site personnel a questionnaire (Appendix A) was sent out to 357 employees who were selected using a systematic random sample algorithm. Included in the test population were DOE and contract personnel. An analysis of the evaluation survey is included in Appendix B. The questionnaire was developed in an attempt to gauge the level of respondent awareness of and involvement in common waste minimization activities at the Site. Of the 357 questionnaires sent out 121 were received. The survey results indicated that a representative cross section of personnel from a diverse job functions responded except for craft personnel which were under represented.

The employee awareness of active waste minimization programs is illustrated in Table 1.

**Table 1**  
**Employee awareness of Recycling Programs**

<u>Recycling Program</u>	<u>Percentage of employees aware of the program</u>
Office Paper	97.5%
Toner Cartridges	89.2%
Cardboard	55.4%
Lead-Acid Batteries	52.9%
Scrap Metal	49.6%

The results indicate employees have a high awareness level of the paper recycling program and toner cartridges. The cardboard, lead-acid batteries, and scrap metal programs are lacking in employee awareness. The lesser known programs are specific to a limited number of job functions, this may explain why knowledge of these programs is minimal.

Employees response to the Site's success in establishing a culture emphasizing the minimization or elimination of waste in all aspects of business practices varied. 58.7% responded that the Site is somewhat approaching a waste minimization culture and 27.3% responded that little or no progress toward establishing a waste minimization culture was evident.

The overall survey results suggest significant progress in waste minimization efforts are achievable through better publicity of programs that are in place and their intended purposes.

#### **Fiscal Year 96 Waste Minimization Program Plan Evaluation**

The FY 96 Waste Minimization Program Plan, Section 4.0 identifies objectives, goals, and implementation strategies for the Site Waste Minimization Program. The objectives and goals are a result of the Sites commitment to waste minimization, documented in the Site Policy Statement 9-16, Rocky Flats Waste Minimization /Pollution Prevention (Appendix C).

The following is an evaluation of achievements made toward each of the waste minimization program objectives.

Objective 1 - Maintain current offsite recycling programs consistent with Rocky Flats policies for release of material to the public, and expand the program to include other items determined to be economically practical.

The Site's recycling programs are coordinated through the Waste Disposal organization. Recycling markets are continuously evaluated for opportunities to recycle materials that may otherwise be designated as waste. Employee participation is promoted through the awareness campaigns conducted throughout the year. The recycling program has proven very effective in preventing materials from being sent to the landfill.

The 1995 goal for paper and cardboard was to increase recycling of these items by 10% over the 1994 values. In 1995 office paper recycling decreased by 2%, attributable to the reduction of personnel at the Site from 6318 in 1994 to 4709 in 1995.

Cardboard recycling increased by 62%, well over the 10% projected goal. The increase of cardboard recycling resulted from a campaign focusing on collecting excess cardboard containers across the Site and an increase in employee awareness of the program.

The Vehicle Maintenance department has been very active in both recycling and reuse programs. Currently they are recycling used motor oils and oil/fuel filters. They also recycle freon and antifreeze by extracting these materials from vehicles, filtering out impurities, and reusing them in the vehicle's systems.

A new contract has been established to recycle electronic scrap, precious metals, and spent photographic fixer solution. The contract will maintain the current rate of recycling for spent photographic fixer solution and add precious metals and electronic scrap to the Site's recycling program. Prior to securing this contract, precious metals and precious metals bearing electronic scrap (circuit boards, switching mechanisms), were either stored onsite or managed as Resource Conservation and Recovery Act (RCRA) hazardous waste. With the instatement of this contract, the Site can now recycle these materials and avoid managing them as hazardous waste.

Additionally, 5 satellite accumulation areas have been eliminated as a result of this contract.

Objective 2 - Reduce or eliminate the generation of waste through raw material substitution, product reformulation, process modification, material segregation, improved housekeeping, and closed loop recycling to achieve minimal facility impact on the environment.

As part of the Site's RCRA Operating Permit annual waste minimization assessments are required to be performed to identify and implement waste minimization techniques. In FY 96, a Pollution Prevention Opportunity Assessment (PPOA) was performed on satellite accumulation areas to evaluate the waste streams and to identify opportunities to reduce the generation or toxicity of the wastes being generated. Thirty-six of the Sites 122 satellite accumulation areas were reviewed, with results detailed in Appendix D. Eleven waste streams identified could be eliminated by recycling, product substitution, or process improvements. Eleven other waste streams will cease generation, and alternate collection methods were identified for 4 waste streams.

By implementing the recommendations identified in the PPOA, significant benefits will be realized in terms of lower operating and disposal costs. Each satellite accumulation area requires approximately one hour per week for inspections and general administration. Eliminating 26 areas will represent a cost savings of \$121,680 in the first year. Recommendations focusing on reducing and eliminating waste generation add to the savings by further reducing handling, storage, and disposal costs.

It is recommended that in the near future the remaining satellite accumulation areas be reviewed for potential waste minimization benefits.

Objective 3 - Conduct continual assessments of Rocky Flats' operations to identify opportunities for waste minimization and needs for research and development.

The Waste Minimization Program conducted one PPOA, established a new recycling contract, and developed a charge back system for waste storage and disposal costs in an effort to meet the needs of the Site.

The charge back system developed in FY 96 required that the generator of the waste be responsible for the storage and disposal costs associated with the waste. The monetary support for this

program was eliminated in the FY 96 budget. This program created an awareness of the actual costs of waste generation.

Objective 4 - Establish specific waste minimization goals, and establish program performance indicators and an information system to report progress realized toward these goals.

The FY 96 Waste Minimization Program Plan, Section 4.2 and 4.3 identifies the waste minimization goals and implementation strategies. Progress made toward waste minimization goals are documented to CDPHE annually in the Annual Report on Waste Generation and Waste Minimization Progress.

Established goals with the DOE represent a 10% annual reduction in waste generation. Measurement criteria for waste minimization goals are generally quantitative and do not reflect the changes in Site operations. Decontamination and decommissioning work and the decreasing Site population are not factored into the reduction goals and can be misleading. As the Site meets its mission goals, waste generation goals are lacking. It is recommended that the 10% reduction goal be addressed, and accurate measurement criteria be established.

Objective 5 - Develop, demonstrate, and implement new and existing waste minimization technologies consistent with identified Site needs.

Numerous organizations and companies onsite work towards the development and implementation of waste minimization technologies. The following is a synopsis of some of the projects under development or completed since the last evaluation.

A composting pilot project to reduce the volume of waste being shipped from the Site sewage treatment plant was completed in 1995. Reduction ratios ranged from 0% to 39% for volatile solids and 37% to 56% for moisture. Results of this study conclude that composting of raw sewage sludge is a feasible alternative for stabilization and disposal.

Philips Lighting Company developed a new technology which reduces mercury loss from fluorescent lighting tubes. An evaluation of these tubes have determined the spent tubes would not be RCRA hazardous waste. A program for implementing the new tubes is anticipated to be developed in 1996.

A charge back system has been developed forcing the cost of waste management on the generator. The system was tested and proven successful in drawing attention to problems of monetary liability, but further development and implementation is unknown at the present.

The Site has begun to investigate the option of recycling radiological contaminated scrap metal during decontamination and decommissioning operations. The feasibility and logistics of the program are being explored in anticipation of initiating and securing a contract to remove materials from the Site.

Other waste minimization technologies being developed and tested at the Site include treatment of cyanide waste, reactive chemical destruction, and hydrolysis destruction of reactive metals.

Objective 6 - Promote a philosophy and work ethic among Site employees that encourages protection of the environment and preservation of natural resources while achieving the facility's strategic mission.

A philosophy and work ethic promoting waste minimization is developing slowly at the Site. The Waste Minimization Program is continually called upon for help and information on ideas and technologies. Employees' abilities to implement new ideas is impacted by the inability to change procedures and the procurement policies of new products. Hence, a slow down in the development of the waste minimization culture.

By integrating waste minimization efforts into the Total Quality Management (TQM) program at the Site some of the difficult challenges encountered by employees could be resolved.

Objective 7 - Establish and demonstrate senior- and middle-management commitment to pollution prevention and waste minimization practices.

Senior- and middle-management have documented their commitment to waste minimization in many formal documents. The Statement Of Work for Rocky Mountain Remediation Services (RMRS), LLC, identified the commitment to waste minimization in the following sections:



### C.2.1.3 Waste Management

...Plans for all waste...shall be fully implemented to achieve appropriate characterization, treatment, storage, transportation, disposal and technology development. Also, waste minimization through reuse, recycle and reclamation, must be integrated through the Contractor across all program boundaries including waste management decontamination and decommissioning, building and project operations, and environmental restoration. The Subcontractor shall provide technical waste minimization services.

### C.2.1.10 Example of Activities and Facilities

#### Program Services

Provide site-wide waste minimization technical services to include preparation of site-wide program for implementation by Contractor on a site-wide basis. Provide technical support services to other site operators and waste generators for the implementation of waste minimization projects. Maintain site-wide center-of-excellence and expertise.

Efforts to accomplish the above mentioned tasks became decentralized during FY 96 and will continue to be as the waste minimization organization dissolves. Funding shortfalls which have been encountered by the Waste Minimization Program (see Table 2) and the recent removal of a central waste minimization organization may create a lax period for the program. It is important to continue awareness programs and explore low cost recycling options.

**Table 2**

YEAR	PERSONNEL	FUNDING LEVEL
FY 93	8	3.0 MILLION
FY 94	12	2.5 MILLION
FY 95	10	2.5 MILLION
FY 96	2.5	0.3 MILLION

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Objective 8 - Enhance communication, both laterally and vertically, among Rocky Flats organizations of waste minimization objectives, goals, ideas, successes, and lessons learned.

Efforts to promote awareness and participation among Site employees has taken on numerous forms performed throughout the year. These include articles published in the Site newspaper, quarterly RMRS newsletter, "bring your daughter to work day", and Earth Day activities.

A strong communication has been established through direct contact with the Waste Minimization Program staff and Site personnel. The staff addresses numerous phone calls each week and routinely attends the Site Environmental Coordinators meetings.

Objective 9 - Collect and exchange waste minimization information at the local and national levels, utilizing technology transfer, outreach, and educational networks.

The Waste Minimization Program staff has attended numerous offsite meetings and conferences to gain knowledge of activities being performed in the industry. These technical forums include the DOE Annual Conference on Pollution Prevention, Colorado Public Service Company GLOBALCON Environmental Seminar, and the DOE training for Affirmative Procurement.

The Waste Minimization Program staff has performed voluntary work in the community focusing on youth education. Earth Day efforts included visits to grade schools educating children on the 3R's (recycle, reduce, and reuse) and on composting of household waste. The Site also supported Earth Day by inviting the office supplies contractor to display office supplies made from recycled materials.

Objective 10 - Develop and implement quality assurance measures for waste minimization activities.

Included in the Waste Minimization Program's function is to accurately report waste generation for the Site. Numerous other organization are also tasked with reporting waste inventories on a routine basis. The Waste and Environmental Management System (WEMS) is the official data base used for tracking all waste onsite. To ensure that accurate and consistent data is being reported a team was established to set standards for reporting. Standards were developed for container volumes, conversion factors, data sets, and data queries.

## **Recommendation**

Senior and middle management, amongst all contractors, need to commit to establishing and maintaining a strong waste minimization culture. Resources must be allocated and not retracted. Many of the waste minimization programs require minimal funding dollars. The cost is the commitment that must be made and adhered to. Management must enforce "waste minimization" much like "safety" in everyday operations. The benefits of waste minimization including cost savings, enhanced morale, improved safety, and reduced environmental liability can only be realized if there is a commitment from everyone.

## Waste Minimization Program Evaluation

The RCRA Permit for Rocky Flats Environmental Technology Site (Site) requires that a waste minimization program be in place and that an annual evaluation be performed to assess its performance. In an attempt to obtain an objective evaluation, questionnaires are being distributed to a cross section of personnel to determine the extent of waste minimization awareness and to gather suggestions for future program improvements. The information will be consolidated and published in the 1996 Waste Minimization Program Plan.

Please complete the following questionnaire and send the completed form immediately to L. Knight, Waste Minimization, T130B.

Which employee category best describes you:

- |                         |                          |
|-------------------------|--------------------------|
| Upper/middle management | <input type="checkbox"/> |
| First line management   | <input type="checkbox"/> |
| Nonmanagement           |                          |
| Crafts                  | <input type="checkbox"/> |
| Admin/Office            | <input type="checkbox"/> |
| Other _____             | <input type="checkbox"/> |

1. What waste minimization efforts are you aware of that are occurring across the site? (Mark all that apply)

- |                                                     |                                                      |
|-----------------------------------------------------|------------------------------------------------------|
| <input checked="" type="checkbox"/> paper recycling | <input type="checkbox"/> scrap metal recycling       |
| <input type="checkbox"/> cafeteria recycling        | <input type="checkbox"/> tire recycling              |
| <input type="checkbox"/> cardboard recycling        | <input type="checkbox"/> plastic recycling           |
| <input type="checkbox"/> glass recycling            | <input type="checkbox"/> light bulb recycling        |
| <input type="checkbox"/> toner cartridge recycling  | <input type="checkbox"/> lead/acid battery recycling |

2. Which of the following waste minimization techniques do you include in your

### Daily Activities

### Planning Activities

- |                          |                                     |                                |
|--------------------------|-------------------------------------|--------------------------------|
| Elimination of Waste     | <input type="checkbox"/>            | <input type="checkbox"/>       |
| Recycling                | <input checked="" type="checkbox"/> | <input type="checkbox"/>       |
| Segregation of Waste     | <input type="checkbox"/>            | <input type="checkbox"/>       |
| Substitution of Products | <input type="checkbox"/>            | <input type="checkbox"/>       |
| Other (please identify)  | <input type="checkbox"/> _____      | <input type="checkbox"/> _____ |

3. If you had a question about waste minimization techniques, which of the following would you call for assistance?

- |                           |                                     |                             |                          |
|---------------------------|-------------------------------------|-----------------------------|--------------------------|
| Your immediate supervisor | <input checked="" type="checkbox"/> | Rocky Flats Fire Department | <input type="checkbox"/> |
| Hazmat team               | <input type="checkbox"/>            | Shift Supervisor            | <input type="checkbox"/> |
| Envir. Coordinator        | <input type="checkbox"/>            | Regulated Waste Operations  | <input type="checkbox"/> |
| Waste minimization Lead   | <input type="checkbox"/>            |                             |                          |

4. The goal of the Waste Minimization organization is to establish a culture which emphasizes the minimization or elimination of waste in all aspects of business practices. Do you feel that the Site is approaching this type of culture?

Very Much

Somewhat

A Little Bit

Not at All

☐

☒

☐

☐

5. Do you have any suggestions on how to emphasize waste minimization at the Site?  
(Please use reverse side of survey.)

3. Would you like a copy of the final analysis?    Yes    ☐    No    ☒  
(If so, please include your mailing address on the reverse side)

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COMPANY

## INTEROFFICE MEMORANDUM

DATE: May 30, 1996  
TO: LaVelle Knight, RMRS, Waste Minimization, Building T130B, x4293  
FROM: *TRG* Thomas R. Gatliffe, Statistical Applications Engineering, Building T130J, x6548  
SUBJECT: ANALYSIS OF WASTE MINIMIZATION EVALUATION SURVEY - TRG-008-96

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### PURPOSE

This memorandum reports results of the analysis of the quantified data provided on May 20, 1996, related to responses received in the Waste Minimization Evaluation Survey conducted earlier this month. This survey was conducted as part of the annual evaluation of waste minimization and pollution prevention awareness and program performance. The results also serve to identify potential improvements for the Waste Minimization Program Plan.

### DISCUSSION

The surveys consisted of one demographic identification item followed by a series of six questions. The first four questions used a multiple-selection format and attempted to gauge the level of respondent awareness of and involvement in common waste minimization activities at Rocky Flats Environmental Technology Site (RFETS). The fifth question sought a free-form response to a request for suggestions for program improvement and the sixth allowed the respondents to request feedback of the survey results. 357 surveys were forwarded to a representative cross section of site personnel chosen using a systematic random sample algorithm. Of these, 121 surveys were filled out and returned. The following paragraphs address the responses to each question sequentially and in relation to the demographic breakdown among various levels of employee positions.

#### Demographics

The first survey item (unnumbered) asked the respondent to select the employee category which best described themselves. The choices were "Upper/middle Management," "First-line Management," and three Non-management selection blocks: "Crafts," "Admin/Office," and "Other." Although the "Admin/Office" selection was meant to encompass most white-collar non-management positions, the number of such positions selecting other indicates that a better term should be used on future surveys. Of the 30 respondents selecting "Other," six were reclassified as "Admin/Office" and two as "First-line Management" based upon the written description given in the blank space provided. 17 of the remaining 22 "Other" responses indicated either some type of "Engineer" or a closely related technical position, so these were given their own unique classification. The last 5 "Other" selections

could not be reclassified because the description block was left blank. One respondent gave no answer. The final breakdown is as follows:

<u>Employee Category</u>	<u># of Respondents</u>
1 Upper/middle Management	23
2 First-line Management	31
3 - 6 Non-management	
3 Crafts	6
4 Admin/Office	38
5 Engineer/Technical	17
6 Other (not specified)	5
0. No answer	1
Total:	121

The proportion of respondents from each category does not appear to differ markedly from that of the site population with the exception of the "Crafts" category of employee, which seems significantly under-represented. This disparity may be due to a perception on the part of employees in this category that surveys are of little value or a suspicion that the results may be used against individual respondents.

The small number of respondents in categories 0, 3, and 6 significantly reduces the precision of estimates which may be based upon their responses. Error margins for estimates of proportions will range from 20 to 50 percent in these categories which have less than ten respondents each. Accordingly, few inferences can be safely drawn with respect to survey responses for these sparse employee categories. The remaining categories will have much smaller worst-case error margins on the order of 10-13 for the moderately-sized employee categories 1 and 5, and 7-9% for the larger categories 2 and 4. For most of the analyses categories 0, 3, and 6 will be combined due to the small number of respondents in each.

Question 1. *What waste minimization efforts are you aware of that are occurring across the site?*

This initial question attempted to measure the level of awareness of ongoing waste minimization efforts at RFETS. It asked the respondent to mark all of the recycling programs of which they were aware and provided a list of ten candidates from which to choose. Only six of the ten are actual programs at RFETS at this time and, of these, three are such that only a limited number of employees have actual contact with them. The six valid programs include paper, toner cartridge, cardboard, lead-acid battery, waste metals, and tire recycling. The last four programs would be expected to have only limited recognition among the general site population as they are handled by selected employee categories and require little or no involvement by most others. The four fictitious programs at this time included light bulb, cafeteria, glass, and plastic recycling. These were included to validate the responses with respect to the real programs and ensure that respondents were selecting conscientiously. The selection results, broken down by employee category and candidate program and arranged in descending order of frequency of selection are as shown in Table 1 on the following page and displayed graphically in Figure 1 on page 4.

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Candidate Recycling Program	Employee Categories							Total for all Resp.
	1 Up/mid Mgmt	2 1st-line Mgmt	3 Crafts	4 Admin/ Office	5 Eng/ Tech.	6 Other	0 (unk), 3, and 6 Comb.	
Paper	23 100%	30 96.8%	5 83.3%	37 97.4%	17 100%	5 100%	11 91.7%	118 97.5%
Toner Cartridges	21 91.3%	28 93.3%	6 100%	33 86.8%	16 94.1%	2 40.0%	9 75.0%	107 89.2%
Cardboard	15 65.2%	19 61.3%	3 50.0%	22 57.9%	7 41.2%	1 20.0%	4 33.3%	67 55.4%
Lead-Acid Batteries	11 47.8%	17 54.8%	3 50.0%	17 44.7%	13 76.5%	2 40.0%	6 50.0%	64 52.9%
Scrap Metal	14 60.9%	17 54.8%	4 66.7%	15 39.5%	8 47.1%	1 20.0%	6 50.0%	60 49.6%
Light Bulbs	6 26.1%	10 32.3%	2 33.3%	7 18.4%	6 35.3%	2 40.0%	4 33.3%	33 27.3%
Cafeteria	3 13.0%	9 29.0%	1 16.7%	13 34.2%	3 17.6%	0 0.0%	1 8.3%	29 24.0%
Glass	1 4.3%	6 19.4%	1 16.7%	3 7.9%	0 0.0%	0 0.0%	1 8.3%	11 9.1%
Tires	0 0.0%	3 9.7%	1 16.7%	5 13.2%	0 0.0%	0 0.0%	1 8.3%	9 7.4%
Plastic	0 0.0%	4 12.9%	1 16.7%	1 2.6%	2 11.8%	0 0.0%	1 8.3%	8 6.6%

Table 1. Response Selections for Question 1.

As might be expected, the paper and toner cartridge recycling programs were well recognized with awareness ranging from 86.8% to 100% for the larger employee groups. The cardboard, lead-acid battery, scrap metal, and tire recycling programs demonstrated generally lower recognition levels, on the order to 40 to 65 percent for the first three and zero to 17% for the last. While these programs directly involve few employees, knowledge of their existence by employees in general could serve to heighten awareness of waste minimization as a plant priority. Therefore more publicity for these programs may be in order.

Somewhat surprisingly, about a quarter of the respondents indicated they believed there are light bulb and cafeteria recycling programs in place. These misperceptions may be based in confusion over the fluorescent bulb collection actions required for hazardous material control and the placement of aluminum can collection containers near cafeteria exits in many buildings. As with the lesser known official recycling programs, the true purposes of these latter two programs could be better publicized to eliminate some of the potential for confusion.

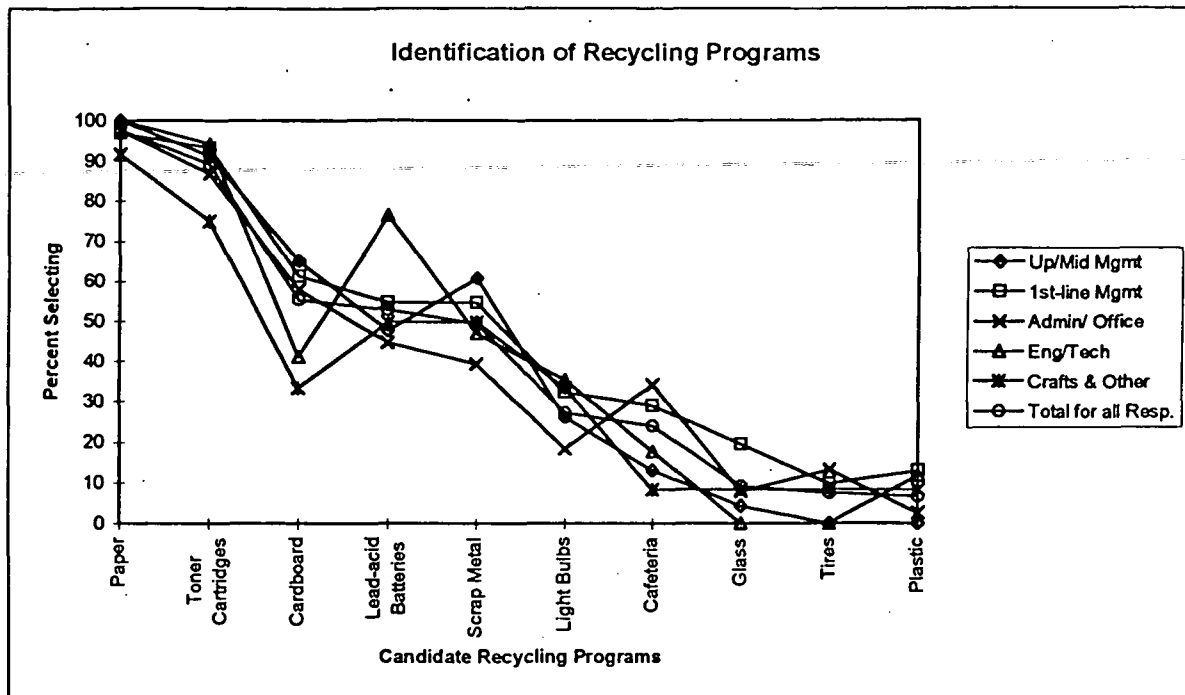


Figure 1. Selection Results of Question 1

Question 2. *Which of the following waste minimization techniques do you include in your daily and/or planning activities?*

The second question suggested four waste minimization techniques and sought to measure the degree to which each was incorporated into planning and daily activities. The four techniques included a) Elimination of Waste, b) Recycling, c) Segregation of Waste, and d) Substitution of Products. Tables 2 and 3 on page 5 show the numbers and percentages of employees in each category reporting use of these techniques on a daily activity level and/or on a planning activity level, respectively. The corresponding plots by employee category for each specific waste minimization technique are displayed in Figures 2 and 3 on page 6. Table 4 on page 5 shows the numbers and percentages of employees in each group who did not report using a particular technique either in daily activity or in planning. The corresponding graph is shown on page 7. Although some of the percentages appear high for certain techniques, it should be noted that only six (5.0%) of the 121 respondents did not report use of at least one of the suggested waste minimization techniques. The six responses which indicated "other" as choices for use identified reuse of materials, two sided copying, and miscellaneous other actions, one of which was blank and some of which were restatements of the specified techniques.

Recycling scored uniformly high among daily waste minimization activities for all groups of employees. Segregation of Waste and Elimination of Waste daily activities scored moderately well, averaging in the 42 to 50% range overall. Substitution of Products scored



very low and this may be due to employee perceptions that they would have little influence in effecting substitutions.

Waste Minimization Technique	Employee Categories							Total for all Resp.
	1 Up/mid Mgmt	2 1st-line Mgmt	3 Crafts	4 Admin/ Office	5 Eng/ Tech.	6 Other	0 (unk), 3, and 6 Comb.	
Elimination of Waste	13 56.5%	14 45.2%	3 50.0%	16 42.1%	3 17.6%	2 40.0%	5 41.7%	51 42.1%
Recycling	20 87.0%	26 83.9%	4 66.7%	33 86.8%	17 100%	3 60.0%	8 66.7%	104 86.0%
Segregation of Waste	16 69.6%	16 51.6%	6 100%	14 36.8%	5 29.4%	2 40.0%	9 75.0%	60 49.6%
Substitution of Products	2 8.7%	3 9.7%	1 16.7%	11 28.9%	2 11.8%	1 20.0%	2 16.7%	20 16.5%
Other Technique(s)	2 8.7%	0 0.0%	0 0.0%	2 5.3%	1 5.9%	0 0.0%	0 0.0%	5 4.1%

Table 2. Employees Reporting Daily Use of Specific Waste Minimization Techniques

Waste Minimization Technique	Employee Categories							Total for all Resp.
	1 Up/mid Mgmt	2 1st-line Mgmt	3 Crafts	4 Admin/ Office	5 Eng/ Tech.	6 Other	0 (unk), 3, and 6 Comb.	
Elimination of Waste	9 39.1%	10 32.3%	1 16.7%	8 21.1%	7 41.2%	1 20.0%	3 25.0%	37 30.6%
Recycling	8 34.8%	7 22.6%	0 0.0%	10 26.3%	3 17.6%	1 20.0%	1 8.3%	29 24.0%
Segregation of Waste	9 39.1%	7 22.6%	0 0.0%	10 26.3%	3 17.6%	1 20.0%	1 8.3%	30 24.8%
Substitution of Products	9 39.1%	8 25.8%	1 16.7%	6 15.8%	5 29.4%	1 20.0%	2 16.7%	30 24.8%
Other Technique(s)	0 0.0%	1 3.2%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.8%

Table 3. Employees Reporting Planning Use of Specific Waste Minimization Techniques

Waste Minimization Technique	Employee Categories							Total for all Resp.
	1 Up/mid Mgmt	2 1st-line Mgmt	3 Crafts	4 Admin/ Office	5 Eng/ Tech.	6 Other	0 (unk), 3, and 6 Comb.	
Elimination of Waste	7 30.4%	14 45.1%	2 33.3%	21 55.3%	9 52.9%	2 40.0%	4 33.3%	55 45.5%
Recycling	2 8.7%	5 16.1%	2 33.3%	5 13.2%	0 0.0%	1 20.0%	3 25.0%	15 12.4%
Segregation of Waste	6 26.1%	13 41.9%	0 0.0%	23 60.5%	10 58.8%	2 40.0%	2 16.7%	54 44.6%
Substitution of Products	14 60.9%	21 67.7%	4 66.7%	25 65.8%	11 64.7%	3 60.0%	8 66.7%	79 65.3%
Other Technique(s)	21 91.3%	30 96.8%	6 100%	36 94.7%	17 94.1%	5 100%	12 100%	115 95.0%

Table 4. Employees Not Reporting Any Use of Specific Waste Minimization Techniques

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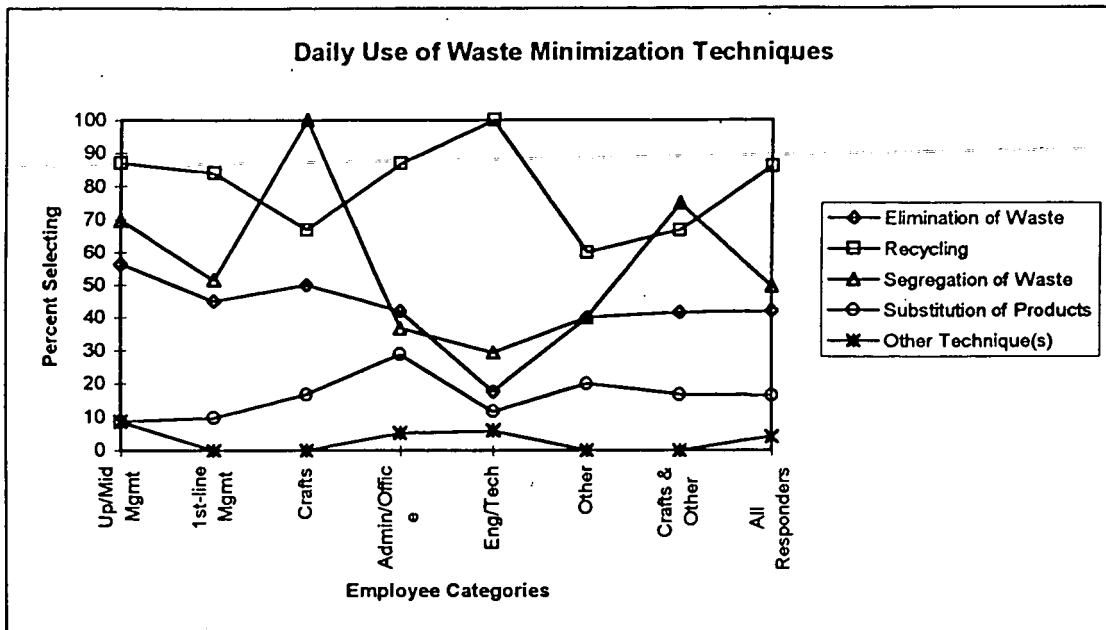


Figure 2.

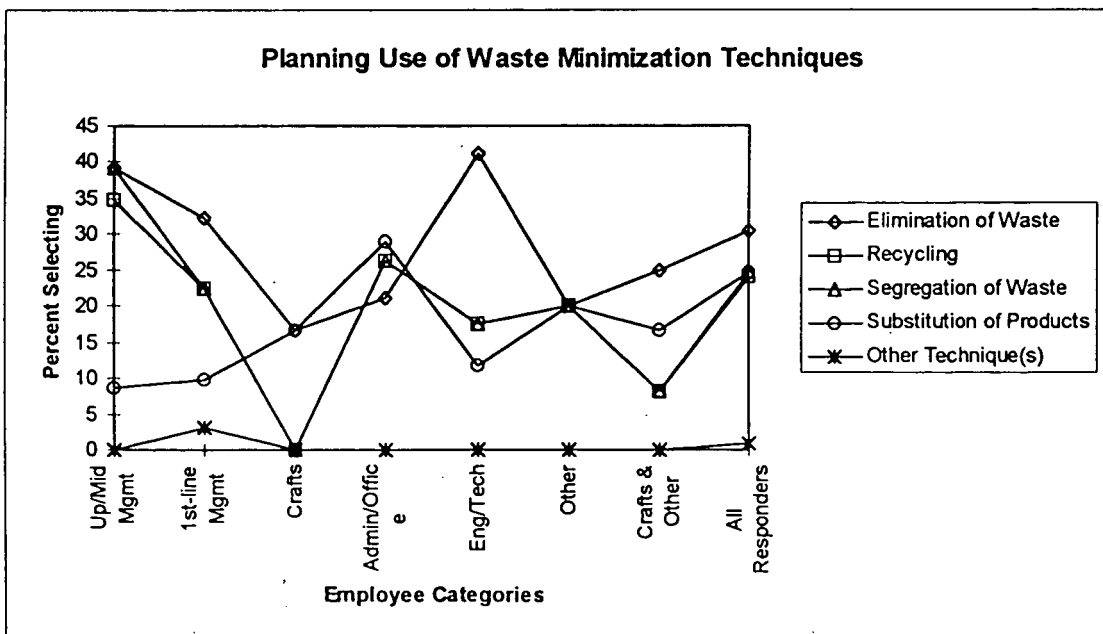


Figure 3.

60

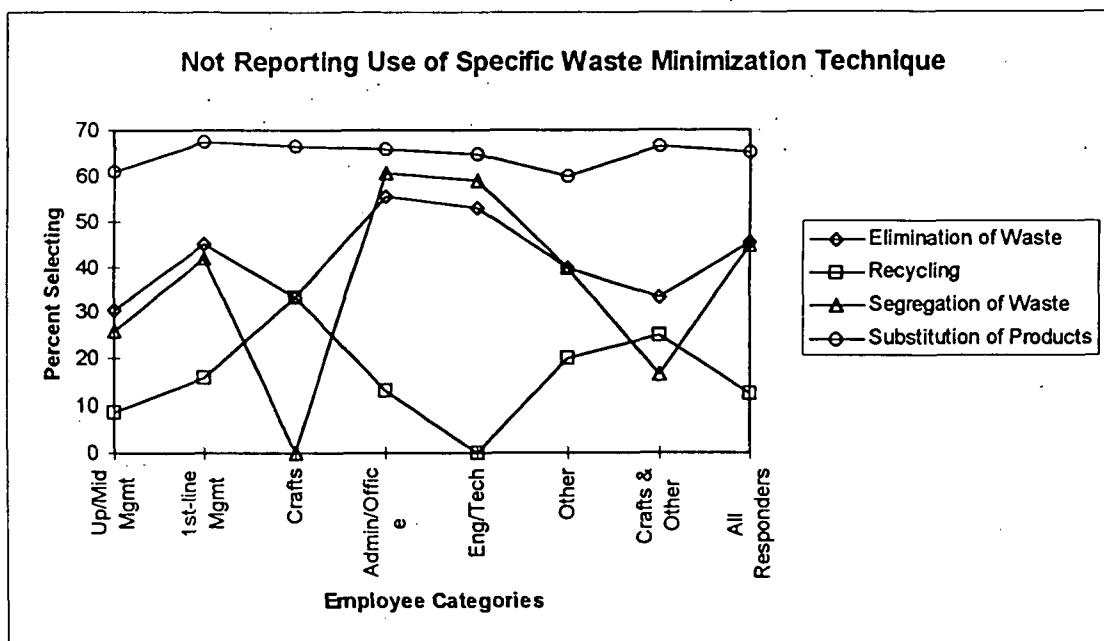


Figure 4.

Incorporating waste minimization techniques into planning appears to be more erratic and variable between different employee categories. Overall response rates averaged between 25 and 30%. The values were approximately one-third those reported for daily waste minimization activities. Elimination of waste was the technique most included in planning at 30%. The others finished in a virtual "dead heat" at 25% use in planning activities.

As noted earlier, Substitution of Products was the least used of the specific waste minimization techniques. This is confirmed by the graph showing that 60 to 68 percent of every employee group did not report using substitution in any regular waste minimization activities.

Question 3: *If you had a question about waste minimization techniques, which of the following would you call for assistance?*

This question offered the respondent seven choices. Three of the choices (Hazmat team, Rocky Flats Fire Department, and Shift Supervisor) are not directly responsible for waste minimization program administration and implementation policies. The other four (Immediate supervisor, Environmental Coordinator, Waste Minimization Lead, and Regulated Waste Operations) are. Therefore any of the last four would be an appropriate choice to seek answers from. The distribution of responses is as shown in Table 5 and Figure 5 on the following page.

The most obvious feature of the responses to this question is the fact that only about six percent or less might contact an inappropriate source initially for help. None of the respondents indicated that they would contact the fire department.

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Candidate Recycling Program	Employee Categories							Total for all Resp.
	1 Up/mid Mgmt	2 1st-line Mgmt	3 Crafts	4 Admin/ Office	5 Eng/ Tech.	6 Other	0 (unk), 3, and 6 Comb.	
Immediate Supervisor	8 34.8%	13 41.9%	4 66.7%	27 71.1%	8 47.1%	5 100%	10 83.3%	66 54.5%
Waste Minim- ization Lead	9 39.1%	17 54.8%	2 33.3%	11 28.9%	5 29.4%	1 20.0%	3 25.0%	45 37.2%
Environmental Coordinator	11 47.8%	9 29.0%	3 50.0%	7 18.4%	4 23.5%	2 40.0%	6 50.0%	37 30.6%
Regulated Waste Ops.	4 17.4%	6 19.4%	0 0.0%	3 7.9%	3 17.6%	2 40.0%	3 25.0%	19 15.7%
Hazmat Team	1 4.3%	0 0.0%	1 16.7%	2 5.3%	0 0.0%	0 0.0%	1 8.3%	4 3.3%
Shift Supervisor	0 0.0%	1 3.2%	1 16.7%	1 2.6%	0 0.0%	0 0.0%	1 8.3%	3 2.5%
Rocky Flats Fire Dept.	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%

Table 5. Selections for Choices for Waste Minimization Question Assistance.

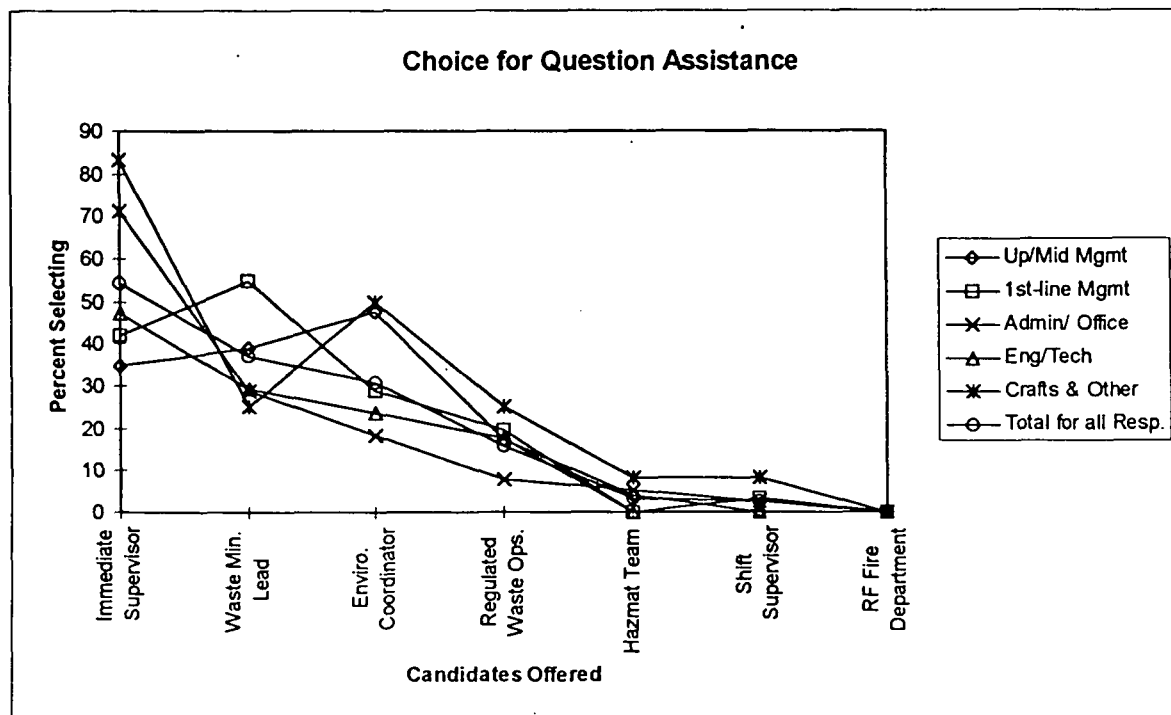


Figure 5.

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Question 4. *The goal of the Waste Minimization organization is to establish a culture which emphasizes the minimization or elimination of waste in all aspects of business practices. Do you feel that the Site is approaching this type of culture?*

This evaluation question indicates some progress toward the goal as indicated by the responses summarized in Table 6 and graphically displayed in Figure 6 below. However,

Culture Achievement Response	Employee Categories							Total for all Resp.
	1 Up/mid Mgmt	2 1st-line Mgmt	3 Crafts	4 Admin/ Office	5 Eng/ Tech.	6 Other	0 (unk), 3, and 6 Comb.	
Not At All	2 8.7%	4 12.9%	0 0.0%	1 2.6%	0 0.0%	1 20.0%	1 8.3%	8 6.6%
A Little Bit	5 21.7%	6 19.4%	0 0.0%	9 23.7%	4 23.5%	1 20.0%	1 8.3%	25 20.7%
Somewhat	15 65.2%	17 54.8%	4 66.7%	20 52.6%	11 64.7%	3 60.0%	8 66.7%	71 58.7%
Very Much	1 4.3%	4 12.9%	2 33.3%	8 21.1%	2 11.8%	0 0.0%	2 16.7%	17 14.0%

Table 6. Degree of Agreement That Culture Goal is Being Achieved.

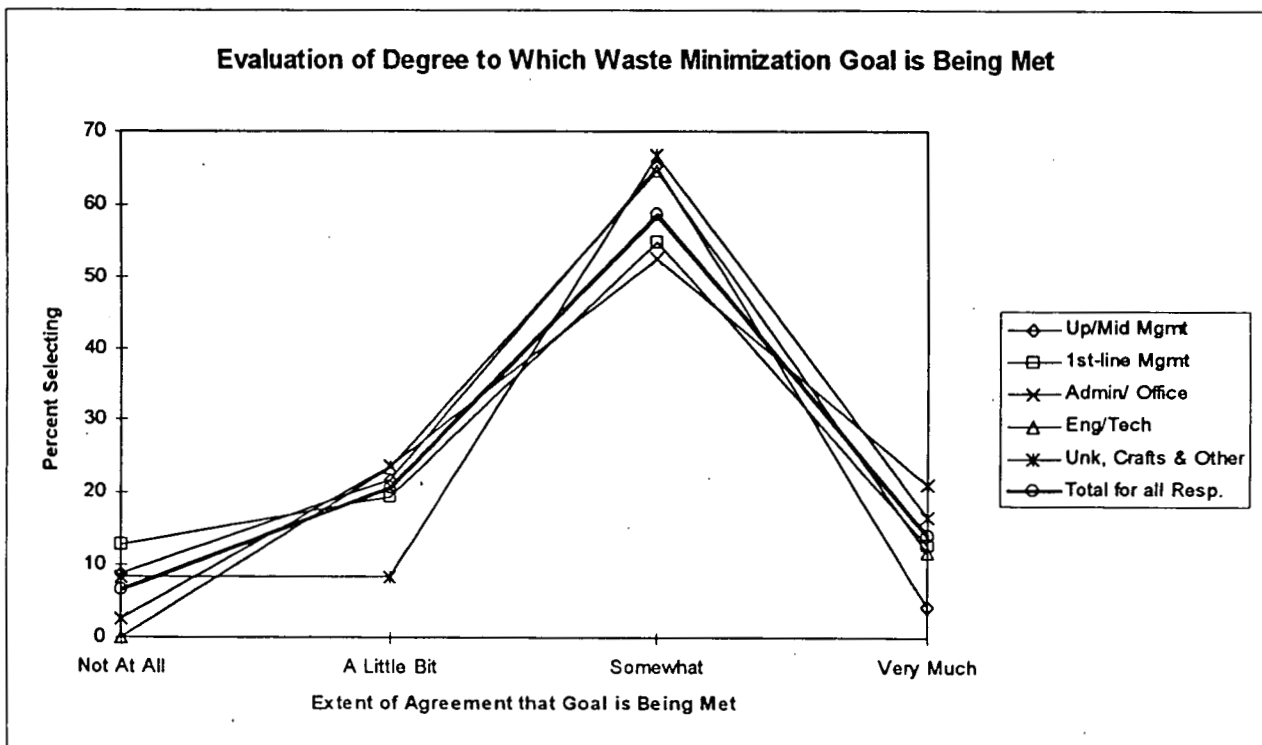


Figure 6.

LaVelle Knight  
May 30, 1996  
TRG-008-96  
Page 10

there is apparently room for improvement in that only fourteen percent of the respondents agree strongly enough to select the "very much" response. The majority in every category selected the luke warm, relatively non-committal selection "Somewhat". About 27 percent felt that little or no progress toward the goal has been made.

## CONCLUSIONS

The survey results suggest that significant progress in waste minimization efforts may be achievable through better publicity for the programs that are in place and the purposes served by them. The misperceptions of which programs exist and the non-use of some programs by individuals in their daily activities imply that employees are not familiar with the particulars of some programs and do not understand how they can contribute to their promotion. For example, anyone could contribute to elimination of waste if they took materials brought from their homes, such as newspapers and lunch packaging materials, back to their homes for disposal. Additionally, employees seem to have a moderately low opinion of how well the waste minimization program is working at RFETS. This might be countered with more aggressive publicity for the lesser known programs.

This survey should form an adequate baseline for a follow-on survey in a few months to gauge the effectiveness of program changes made in response to the observed indicators. I would recommend that the follow-up survey be worded very similarly in order to achieve simplified correspondence in the survey elements.

If you have questions or desire further information concerning the information provided in this letter or if I may be of further assistance with regard to this or any other matter, please do not hesitate to contact me at your convenience.

cc:

E. J. Nuccio, Engineering Support Services

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## **POLICY 9-16**

Revision 0  
January 4, 1994  
Page 1 of 5

### **WASTE MINIMIZATION (POLLUTION PREVENTION)**

#### **POLICY**

Reduction or elimination of waste, discharges, and other forms of emissions shall be minimized in support of commitment to the health and safety of the workforce, the general public, and the natural integrity of the environment.

#### **SCOPE**

This policy applies to all EG&G Rocky Flats, Inc. organizations, employees, and subcontractors who generate waste and environmental pollutants during the performance of work at the Rocky Flats Plant (RFP).

Waste minimization and pollution prevention are the responsibilities of every employee and include, without being limited to, actions such as the following:

- Elimination of unnecessary materials, including personal items, in areas where the presence of, or potential for, contamination may result in needless radioactive waste.
- Participation in approved recycling programs.
- Resource preservation through water and electricity conservation.

Source reduction techniques will be given first priority in the hierarchy of waste minimization and environmental protection practices followed by environmentally sound recycling and treatment of waste and other pollutants to reduce volume, toxicity, and mobility prior to storage and disposal.

Source reduction is accomplished through:

- Process input substitutions
- Product reformulation
- Process modifications and upgrades
- Improved housekeeping
- Closed-loop (in-plant) recycling

Environmentally sound recycling encompasses the use of off-site services to recycle plant materials, provided that the recycling benefits outweigh likely environmental degradation caused by the physical or chemical processes used to reclaim the materials.

This policy supersedes Policy 6-12, Rocky Flats Waste Minimization, dated March 31, 1990.

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## Policy 9-16

Revision 0

January 4, 1994

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### DEFINITIONS

Pollution Prevention: A multi-media approach to reduction or elimination of environmentally harmful releases. The EPA Pollution Prevention policy focuses on the prevention of pollution through source reduction and environmentally sound recycling techniques. Term is currently being used in place of "waste minimization" in regulatory jargon.

Waste Minimization: Any source elimination, reduction, or recycling activity that results in reduction of the total quantity or toxicity of the waste consistent with the goal of minimizing present and future threats to human health and the environment.

Waste minimization encompasses source reduction and recycling activities in the EPA Resource Conservation and Recovery Act (RCRA) hazardous waste program, but in regulatory jargon, "waste minimization" has been superseded by "pollution prevention" which has applicability beyond the hazardous waste context.

Waste Reduction: A Department of Energy (DOE) term for ALL source reduction, recycling, and waste treatment activities.

The DOE "waste reduction" convention, unlike EPA "waste minimization," allows credit for physical or chemical treatment for reduction of waste volume, toxicity, or mobility. For example, DOE considers super compaction a form of waste reduction while the EPA does NOT consider super compaction a form of waste minimization because the mass of the waste is unchanged.

### RESPONSIBILITIES

#### Associate General Manager, Environmental and Waste Management

Ensures development of the annual Waste Minimization Program Plan, consistent with federal/state permits, compliance agreements, and other applicable regulatory requirements and DOE directives, and the maintenance of procedures or requirements manuals to guide waste minimization/pollution prevention at RFP.

Ensures development of a formal plan to guide assessment, discovery, evaluation, and implementation of the best, demonstrated, available technologies for waste minimization consistent with the RFP mission.

Guides establishment of annual goals for reduction of volume, mass, or toxicity of RFP waste streams.

Provides annual review of waste minimization effectiveness to formally identify potential areas of improvement.



**RESPONSIBILITIES, Continued**

Establishes and chairs the Waste Minimization Executive Steering Committee to provide senior management with waste minimization awareness, guidance, and direction.

Ensures provision of compliance guidance, monitoring, and evaluation for other Associate General Managers (AGMs) applicable to the scope of this policy.

**Associate General Manager, Engineering and Technology**

Ensures incorporation of waste minimization and pollution prevention principles into the design of new processes and facilities, and into process change and facility modification.

**Associate General Managers**

Ensure process waste assessments are completed within respective areas and operations.

Ensure development of annual waste minimization goals and achievement plans, consistent with the site Waste Minimization Program Plan and goals to include provisions for training employees on organization-specific goals and methods.

**ACTIONS REQUIRED**

**1. Manager, Waste Minimization:**

- A. Establishes and chairs a Waste Minimization Working Group to promote waste generator involvement, improve communications among organizations and employees, and improve overall waste minimization effectiveness.
- B. Ensures waste minimization training development and availability for personnel commensurate with involvement in waste generation.
- C. Conducts waste minimization pre-design review of capital equipment and expense projects (including equipment stripout, decontamination and decommissioning, demolition, and environmental remediation projects).

**2. Procurement:**

- A. Implements a procurement preference in favor of products composed of recovered (recycled) material, wherever practicable.

## Policy 9-16

Revision 0

January 4, 1994

Page 4 of 5

### ACTIONS REQUIRED, Continued

- B. Incorporates contractual stipulation, per Waste Minimization guidance, that subcontractors follow RFP waste minimization plans and procedures.
  - C. Prepares and submits the required Agency Annual Report on Affirmative Procurement to DOE, Rocky Flats Office (RFO).
3. Facilities Project Management ensures that subcontractors implement waste minimization plans and procedures consistent with those of EG&G Rocky Flats, Inc.
4. RFP Management and Supervision:
- A. Constantly review work areas for opportunities to reduce waste generation as part of organizational Self Evaluation. (See 1-11000-ADM-16.10, Self Evaluation Program.)
  - B. Incorporate waste minimization practices/tasks into work control documents, where practicable.
  - C. Identify waste minimization goals in job performance objectives and evaluate employee contribution(s) in performance appraisals, where appropriate to the organizational scope of work.
5. Operations and Maintenance Managers, Supervisors, and Foremen:
- A. Convey waste minimization methods and priorities during pre-evolution briefings.
  - B. Monitor work in progress to ensure utilization of waste minimization during performance of work.
  - C. Ensure maintenance of proper segregation of materials or substances as early as practicable in the waste generation process: radioactive, nonradioactive, RCRA-regulated (mixed and hazardous), and recyclable materials.
  - D. Whenever possible, ensure proper identification of radioactive contaminated material appropriate for decontamination and reuse.

### REFERENCES

Pollution Prevention Act

Resource Conservation Recovery Act (RCRA)

69

REFERENCES, Continued

10 CFR, Energy

40 CFR, Protection of Environment

58FR31114, EPA Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program

DOE 5400.1, General Environmental Protection Program

DOE SECY Memo, Secretary Watkins Memorandum on Waste Minimization and Pollution Prevention, 8/20/92

DOE-SEN-37-92, Waste Minimization Crosscut Plan Implementation

EPA Pollution Prevention Strategy, February 7, 1991

Executive Order 12780, Federal Agency Recycling and the Council on Federal Recycling and Procurement Policy

Executive Order 12843, Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances

Colorado Department of Health State RCRA Permit Number 91-09-30-01

Policy 10-12, RCRA-Regulated Material Procurement Control

1-11000-ADM-16.10, Self-Evaluation Program

APPROVED: \_\_\_\_\_



General Manager

Pollution Prevention Opportunity Assessment  
Table 1

Building	SAA Number	Waste Type	Recommendation	Action Taken
111	2209	Photo Laboratory	Process Improvement	Eliminate Area
119	1489	Ni-Cd Batteries	Collect in 90-day	Eliminate Area
119	1782	Electronic Scrap	Recycle	Eliminate Area
333	2265	Paint Solvents	Product Substitution	Decrease Toxicity
333	332	Paint Waste	Product Substitution	Eliminate Area
334	343	Scrap and Batteries	Recycle	Eliminate Area
460	2014	Carbide Paper	No Longer Needed	Eliminate Area
460	1804	Electronic Scrap	No Longer Needed	Eliminate Area
460	1805	Batteries	No Longer Needed	Eliminate Area
460	2010	Mercury	No Longer Needed	Eliminate Area
460	2214	Fluorescent Lamps	No Longer Needed	Eliminate Area
460	480	Combustibles	No Longer Needed	Eliminate Area
561	1485	Combustibles	Collect In Permitted Storage	Eliminate Area
865	2289	Combustibles	Maintain	Maintain
865	2303	Scrap	Recycle	Eliminate Area
881	1248	Liquid Waste	Process Improvement	Eliminate Area
881	1870	Combustibles	Process Improvement	Eliminate Area
881	1895	Polymer Solidification	Maintain	Maintain
881	1426	Corrosion Studies	Consolidate with 2251	Eliminate Area
881	2251	Corrosion Studies	Consolidate with 1426	Maintain
881	1739	Lead Gloves	Collect in 90-day	Eliminate Area
881	2245	Cyanide Waste	Maintain	Maintain
881	2250	Samples	No Longer Needed	Eliminate Area
881	2262	Combustibles	Process Improvement	Eliminate Area
881	2084	Paint Waste	Maintain	Maintain
881	2165	Oil	No Longer Needed	Eliminate Area
881	2257	Liquid Waste	No Longer Needed	Eliminate Area
883	2226	Scrap Metal	Recycle	Eliminate Area
883	2227	Combustibles	Maintain	Maintain
883	2268	Fluorescent Lamps	Maintain	Maintain
883	WMU2268	Fluorescent Lamps	Duplicate	Eliminate Area
886	2207	Fluorescent Lamps	Maintain	Maintain
991	1829	Ni-Cd Batteries	Collect in 90-day	Eliminate Area
991	1827	Electronic Scrap	Recycle	Eliminate Area
993A	1517	Ignitable Liquids	No Longer Needed	Eliminate Area
T903A	1692	Ignitable Liquids	No Longer Needed	Eliminate Area

36 Total Satellite Accumulation Areas Evaluated

27 Can be eliminated

- 11 No longer needed
- 5 Waste can be Recycled
- 6 Eliminated by Process Improvements
- 4 Collect in 90-day or storage area
- 1 Duplicate in system

- 1 Reduce the toxicity of the waste
- 8 Must be maintained to support operations
- 2 Fluorescent Lamps

1995 Annual Report on Waste  
Generation and Waste Minimization  
Progress

United States Department of Energy  
Rocky Flats Environmental Technology Site

Prepared for:

U.S. Department of Energy  
Rocky Flats Field Office

Prepared by:

Rocky Flats Environmental Technology Site  
Rocky Mountain Remediation Services  
Hazardous Waste Disposal  
August 1, 1996

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## I. Executive Summary

The 1995 Annual Report on Waste Generation and Waste Minimization Progress presents waste generation statistics for calendar years 1994 and 1995; and highlights progress in waste minimization efforts at the U.S. Department of Energy's (DOE) Rocky Flats Environmental Technology Site (Site).

Waste minimization accomplishments in 1995 include the completion of four Pollution Prevention Opportunity Assessments. These assessments were performed on waste streams with significant generation rates and potential for reductions in generation through product substitution or enhanced technology. The areas assessed included Laundry Waste Water Building 566, Radiological Material Management Area Building 566, Operable Unit 1, and Analytical Laboratories Building 881.

To assist in the identification of areas to concentrate pollution prevention / waste minimization efforts a Top Ten List was developed. This list identified waste streams which were routine and would continue to be generated. The criteria used to rank the waste streams included the generation rate, toxicity, and radiological classification. Waste streams were ranked by which would benefit the most by reducing its generation rate. This information will be of value when planning for future assessments.

New technologies have been researched to aid in minimizing waste generation. These technologies included composting of sewage sludge to reduce volume, fluorescent lighting tubes with mechanisms that reduce mercury loss, charge back system to transfer the waste management costs to the generator, and recycling of radiological contaminated scrap metal. Future development of these technologies is contingent on future requirements and funding availability.

Generation of transuranic waste in 1995 remained consistent with waste generated in 1994. The majority of transuranic waste generated was in the form of light metal and plastics from Building 707. Generation of transuranic-mixed waste was reduced by 25% in 1995, the majority being lead gloves. Low-level radioactive waste generation increased by 43%. Renovation work in Building 883 generated 12% of the total, the major single point contributor of this waste. Low-level radioactive waste generated routinely accounts for 87% of the waste stream. Low-level mixed waste increased by 15%, the majority of the low-level mixed waste stream was generated by environmental restoration work performed at Building 904 Pad. Resource Conservation and Recovery Act hazardous waste generation increased by 22% in 1995, this is due to the Site's efforts to manage excess chemicals. Toxic Substance Control Act regulated waste generation rate increased significantly in 1995, 535%. This increase is attributable to renovation work generating asbestos materials at Building 443, Steam Plant and Building 991.

Recycling activities included 389 tons of office paper, 71 tons of cardboard, 167 tons of scrap metals, 2,006 toner cartridges, and 11 tons of lead/acid batteries. The 1995 office

paper recycling efforts decreased 2% from 1994. This decrease was primarily due to a reduction of personnel onsite. The 1995 cardboard recycling increased 62% over 1994. The increase is attributable to the collection of excess cardboard identified across the Site. The scrap metal recycling program decreased by 67% in 1995. The termination of production operations has significantly reduced the amount of scrap metal generated. However, decontamination and decommissioning activities will cause the scrap metal recycling program to escalate in the future. Toner cartridge recycling decreased by 26%, this is also attributable to reduction in personnel. Lead/acid battery recycling increased 266% from the 1994 values. Recycling prevented an estimated 2,087 m<sup>3</sup> of materials from being disposed of in the Site landfill, this is a 8% reduction from 1994.



## II. General Site Information

### General Site Mission

Construction of the Rocky Flats Environmental Technology Site (Site) began in 1951 to increase the nation's production of nuclear weapons components. The Site manufactured weapons components from plutonium, uranium, stainless steel and beryllium. Primary operations include metal fabrication, assembly and testing; chemical recovery and purification; waste management and environmental remediation. In January 1992, the President of the United States canceled the W-88 Weapons Program. The Site mission has shifted from nuclear weapons production to cleanup, deactivation, and preparation for decontamination and decommissioning.

### Mailing Address

P.O. Box 464 Golden, Colorado 80402-0464

The Department of Energy Rocky Flats Field Office organization which administer waste minimization activities at the Site is Environment, Safety, Health and Program Assessment.

### Point of Contact (DOE)

Regina Sarter  
DOE-Rocky Flats Field Office  
Phone: (303)966-7252  
Fax: (303)966-4728

### Point of Contact (Contractor)

Randy Leitner  
Kaiser-Hill  
Phone: (303)966-3537  
Fax: (303)966-3578

Site Size (acres)	Number of Employees	
	DOE	Contractor
6500	302	4457*

\*This includes Kaiser-Hill, Safe Sites of Colorado, Rocky Mountain Remediation Services, Wackenhut Services, DynCorp of Colorado, and Los Alamos Technical Associates.

### III. Site Generation Data

Waste is measured and tracked at the Site through the Waste and Environmental Management System (WEMS). The WEMS records waste by category, Item Description Code (IDC), and point of generation. Waste is measured in volume and converted to units of weight as appropriate. Categories of waste include transuranic (TRU), transuranic-mixed (TRM), low-level (LLW), low-level-mixed (LLM), and Resource Conservation and Recovery Act (RCRA). Waste regulated under Toxic Substances Control Act (TSCA) is TSCA (non-radioactive), TRU-TSCA, and LLW TSCA. The TRU TSCA generation data is included in the TRU waste generation totals and the LLW TSCA generation data was included in the LLW generation totals.

Annual goals for waste reduction and recycling at the Site are based on a 10% reduction in each category of solid waste. Calendar year 1993 is the baseline used to measure performance of 1995 goals. Waste generation for 1995 is represented by three different tables. Total waste generated is identified in Table 1.0 and compares the amounts generated in 1994 with 1995. Table 1.1 breaks down waste in 1994 and 1995 by generation activity including routine, decontamination and decommissioning, and environmental restoration. Waste generation in 1995 compared to projected reduction goals is shown in Table 1.2. Only routine waste generation is measured against the 10% reduction goal to be consistent with the baseline used in past reports.

Table 1.2 shows, reduction goals of routine waste generation were met for TRM and LLM in 1995. Routine TRU waste generation goals were not met, however the overall generation remained essentially the same. Routine generation rate increased for LLW, RCRA, and TSCA. The LLW routine generation rate was impacted by the renovation of Buildings 883, but was not included as part of the decommissioning and decommissioning rate. RCRA hazardous waste generation increased over 110% due to a massive excess chemical disposition effort at the Site. TSCA waste generation increased significantly due to the renovation of Building 443, and Building 991.

Environmental Restoration work continues to grow, generating 159 m<sup>3</sup> of LLM, 10 m<sup>3</sup> of LLW, and 81,647 kg. of RCRA hazardous wastes in 1995. Decontamination and decommissioning activities increased in 1995, and is anticipated that the generation will continue to increase as the work continues. Decontamination and decommissioning in 1995 generated 91m<sup>3</sup> of LLW wastes and 5 m<sup>3</sup> of LLM. Sanitary waste was reduced 8% during 1995 due in part to the reduction in personnel and more effective recycling programs.

**Table 1.0. Total Waste Generated**

Waste Type	1993	1994	1995	Percentage Change 1994 to 1995
Transuranic (TRU)	16 m <sup>3</sup>	20 m <sup>3</sup>	20 m <sup>3</sup>	0 %
TRU-Mixed (TRM)	8 m <sup>3</sup>	4 m <sup>3</sup>	3 m <sup>3</sup>	-25 %
Low-Level (LLW)	592 m <sup>3</sup>	540 m <sup>3</sup>	773 m <sup>3</sup>	43 %
LLW-Mixed (LLM)	469 m <sup>3</sup>	288 m <sup>3</sup>	244 m <sup>3</sup>	15 %
RCRA Hazardous	36,515 kg.	198,009 kg.	241,607 kg.	22 %
TSCA	10,904 kg.	5,908 kg.	37,523 kg.	535 %
Sanitary	3,545.75 tons	3,011.25 tons	2,759 tons	-8 %

(For explanations of percentage changes see Section III. Site Generation Data)

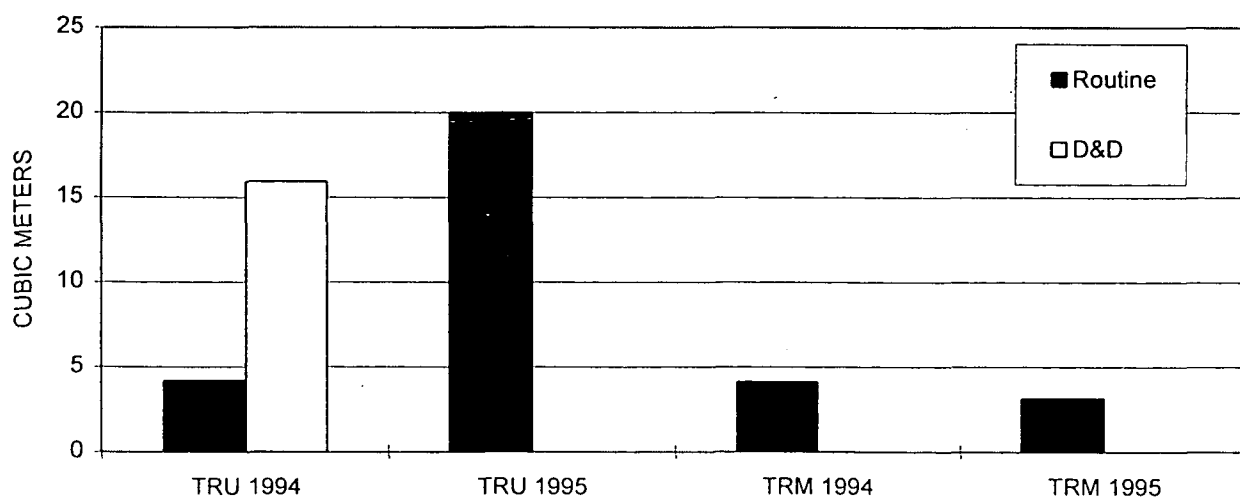
**Table 1.1. Waste Generation Distribution By Activity**

Waste Type	Routine		Decontamination & Decommissioning		Environmental Restoration	
	1994	1995	1994	1995	1994	1995
Transuranic (TRU)	4 m <sup>3</sup>	20 m <sup>3</sup>	16 m <sup>3</sup>	0 m <sup>3</sup>	0 m <sup>3</sup>	0 m <sup>3</sup>
TRU-Mixed (TRM)	4 m <sup>3</sup>	3 m <sup>3</sup>	0 m <sup>3</sup>	0 m <sup>3</sup>	0 m <sup>3</sup>	0 m <sup>3</sup>
Low-Level (LLW)	540 m <sup>3</sup>	672 m <sup>3</sup>	68 m <sup>3</sup>	91 m <sup>3</sup>	10 m <sup>3</sup>	10 m <sup>3</sup>
LLW-Mixed (LLM)	288 m <sup>3</sup>	79 m <sup>3</sup>	0 m <sup>3</sup>	5 m <sup>3</sup>	13 m <sup>3</sup>	159 m <sup>3</sup>
RCRA Hazardous	52,274 kg.	109,591 kg.	0 kg.	0 m <sup>3</sup>	145,735 kg.	81,647 kg.
TSCA	5,908 kg.	37,523 kg.	(TSCA and Sanitary wastes are not tracked by activity)			
Sanitary	3,011 tons	2,759 tons				

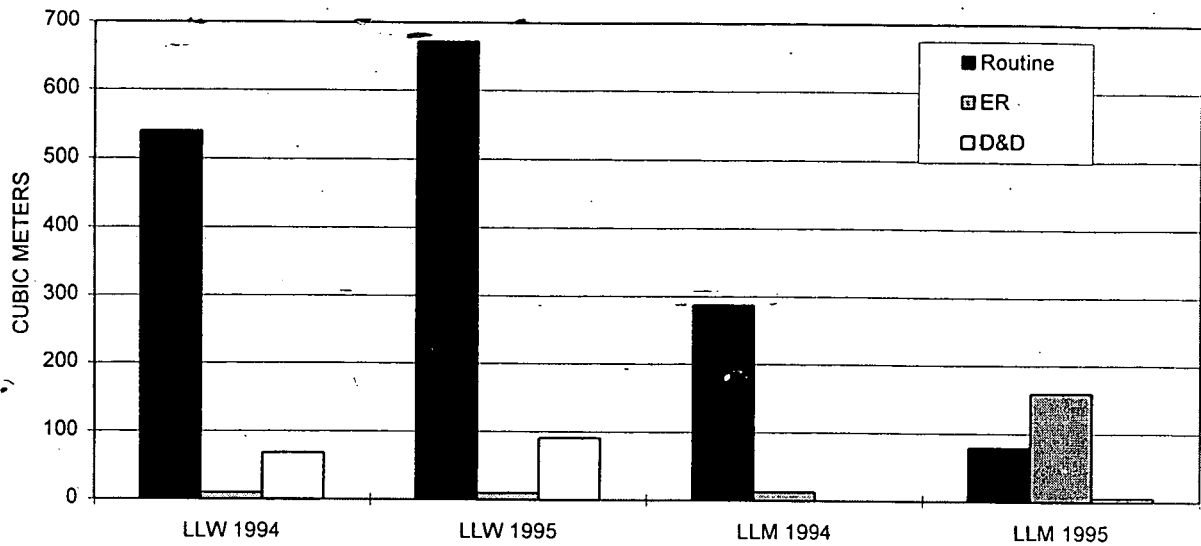
**Table 1.2. 1995 Routine Generation Against Projected Goals**

Waste Type	1994 Generation of Routine Waste	1995 Goal (10% Reduction)	1995 Generation of Routine Waste	Percentage Change
Transuranic (TRU)	4.21 m <sup>3</sup>	$\leq 3.79$ m <sup>3</sup>	20 m <sup>3</sup>	375 %
TRU-Mixed (TRM)	4.13 m <sup>3</sup>	$\leq 3.72$ m <sup>3</sup>	3.15 m <sup>3</sup>	-24 %
Low-Level (LLW)	540 m <sup>3</sup>	$\leq 486$ m <sup>3</sup>	672 m <sup>3</sup>	27 %
LLW-Mixed (LLM)	288 m <sup>3</sup>	$\leq 260$ m <sup>3</sup>	79 m <sup>3</sup>	-73 %
RCRA Hazardous	52,274 kg.	$\leq 47,047$ kg.	109,591 kg.	110 %
TSCA	5,908 kg.	$\leq 5,318$ kg.	37,523 kg.	535 %

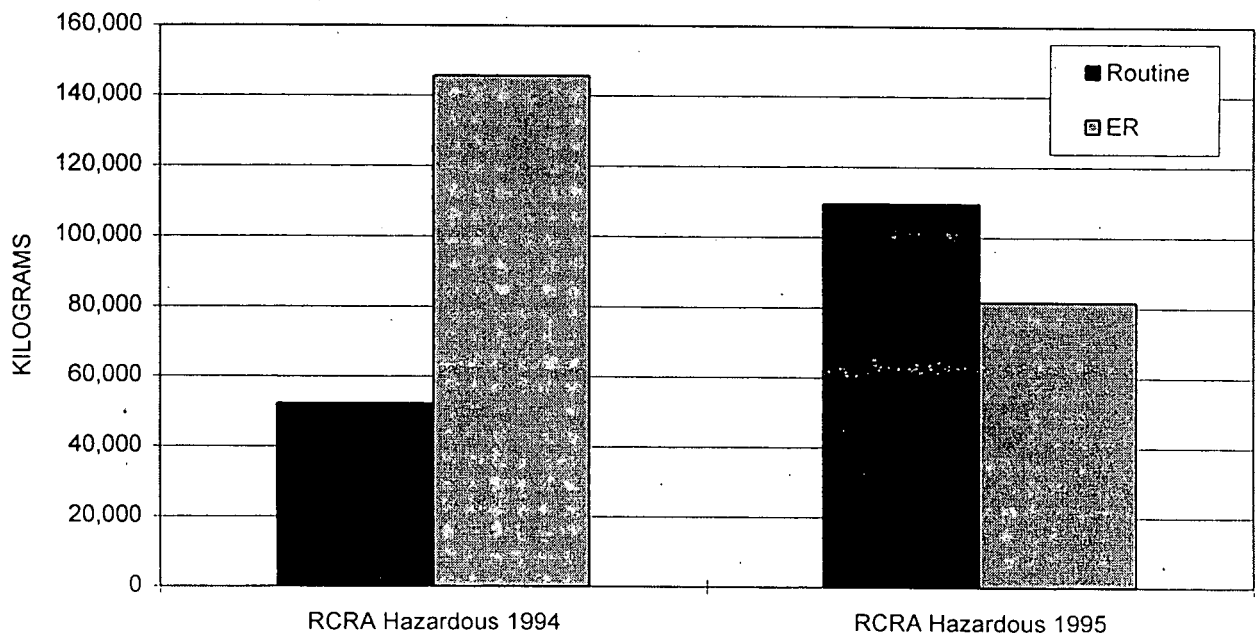
**Transuranic and Transuranic Mixed Waste**



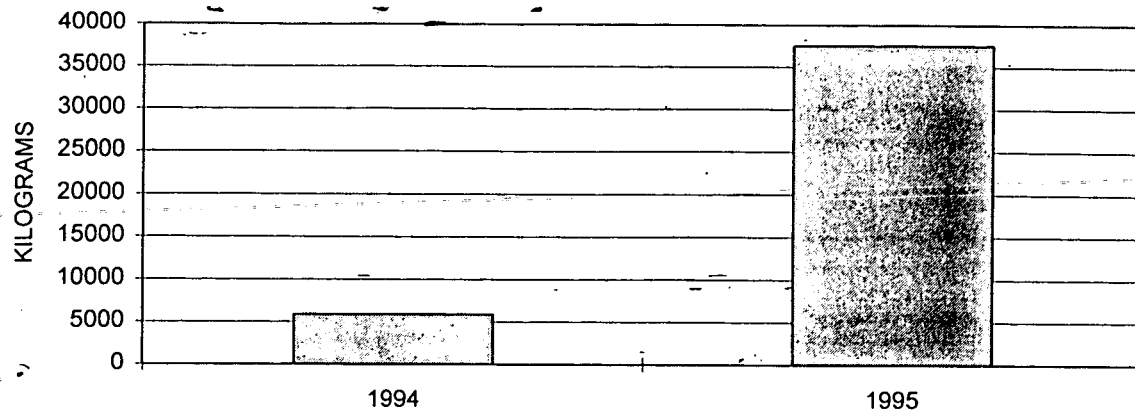
### Low-Level and Low-Level Mixed Waste



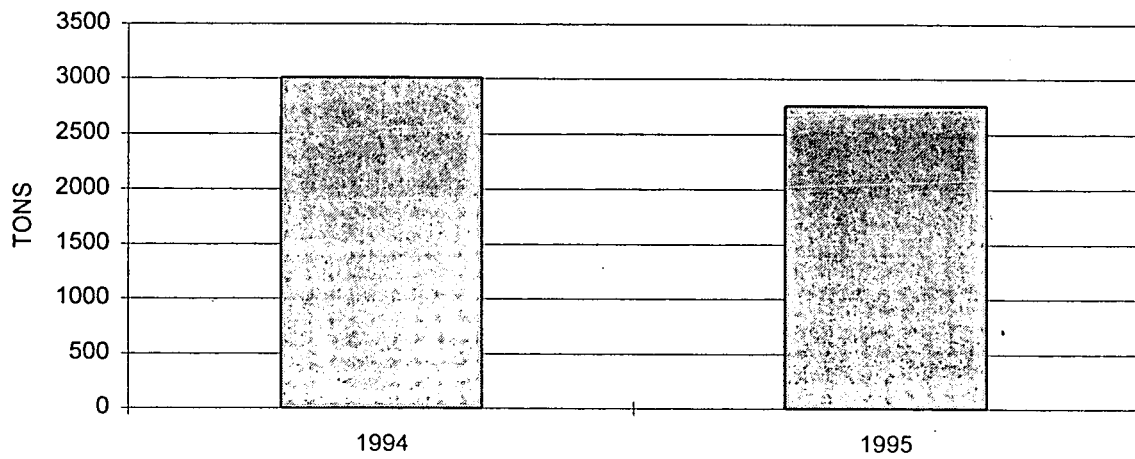
### RCRA Hazardous Waste



TSCA Waste



Sanitary Waste



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## IV. Site-Wide Waste Minimization Accomplishments

### Training:

Waste Minimization training is provided to Site employees commensurate with their job responsibilities. Three separate courses were available in 1995: General Employee Training (GET), repeated every two years; the Waste Generator Training course, repeated every two years; and the RCRA Computer-Based Training course, repeated annually. Each one of these training courses addresses waste minimization / pollution prevention.

### Incentives:

Several incentives existed for employees to prevent/reduce pollution at the Site. EG&G Rocky Flats, under the Employee Awards of Excellence program, awarded any employee that contributed to significant improvements in waste minimization or pollution prevention. There were three \$350 awards granted in 1995. These awards were given for recognition in the areas of the Reassessment of Resource Conservation and Recovery Act (RCRA) Waste Characterizations and Reduction of RCRA Hazardous Waste In the Well Abandonment Program.

EG&G Corporate also sponsored the Waste Reduction Pays Recognition and Awards Program. The program promoted the creation of awards at the division level and also recognized outstanding individuals for their efforts in waste minimization and pollution prevention. Two Site employees were awarded the EG&G Corporate Waste Reduction Pays Award in October, 1995. The awards were issued for outstanding efforts in the management and disposition of precious metals and for the Site Waste Management Program.

The DOE sponsors the DOE Pollution Prevention Awards Program recognizing DOE employees and Contractors for outstanding pollution prevention and recycling activities. The program has fourteen categories for awards, ranging from Zero Generation to Technology Transfer.

**Employee Awareness/Outreach:**

Efforts to promote awareness and participation among Site are performed continuously throughout the year in various ways. They include articles published in the Site newspaper, quarterly Waste Minimization news letter, bring your daughter to work day, and recycled product display arranged for employees during Earth Day.

**Tracking/Reporting/Planning Systems:**

Waste is measured and tracked at the Site by WEMS, this system records waste by category, IDC, and point of generation.

A Chemical Management group was formed during 1994 to track hazardous chemicals. Hazardous chemicals are tracked per the Emergency Planning and Community Right-To-Know Act (EPCRA) Form R reporting requirements and to allow a method to identify chemicals available for use.

**Source Reduction:**

Waste minimization accomplishments in 1995 included the completion of four Pollution Prevention Opportunity Assessments (PPOA). These assessments were performed on waste streams with significant generation rates and potential for reductions in generation through product substitution or enhanced technology. The areas assessed included Laundry Waste Water Building 566, Radiological Material Management Area Building 566, Operable Unit 1, and the Analytical Laboratories Building 881.

The Laundry Waste Water assessment presented alternative approaches to handling the laundry waste water from Building 566. Approaches include elimination of current processing requirements on the rinse water and to treat only the wash water at the source of generation. This assessment included feasibility studies and bench mark treatability studies.

The Radiological Material Management Area (RMMA) assessment evaluated the impact of reducing the boundary of the existing RMMA in Building 566 to reduce low-level radioactive waste generated. Results equated to a reduction of 87% of the total projected waste to be generated and approximately \$41K the first year.



The Operable Unit 1 assessment was to evaluate the largest consuming process of acid on Site. The assessment included a feasibility study on alternate process options and disposal techniques.

A PPOA was performed on 21 processes in Building 881 analytical laboratories. The objective was to evaluate input materials and parameters of the process, identify pollution and waste exiting in the process, and generate and evaluate options for pollution prevention / waste minimization.

### **Recycling/Reuse Programs:**

The Site's recycling programs are coordinated through the Waste Disposal organization. Recycling markets are continuously evaluated for opportunities to recycle materials that may otherwise be designated as waste. Employee participation is promoted through the Rocky Flats Recycling Programs and awareness campaigns conducted throughout the year. The recycling program has proven very effective in preventing materials from being sent to the landfill.

The 1995 recycling goals for paper and cardboard were to be 10% over 1994 values. Actual office paper recycling decreased 2% in 1995, attributable to the reduction of personnel. Personnel was reduced from 6318 in 1994 to 4709 in 1995, a reduction of 25%.

Cardboard recycling increased by 62%, well over the 10% projected goal. The increase of cardboard recycling is due to a campaign focusing on collecting excess cardboard and an increase in employee awareness.

The Vehicle Maintenance department has been very active in both recycling and reuse areas. They are currently recycling used motor oils and oil/fuel filters. They also recycle freon and antifreeze by extracting these materials from vehicles, filtering out impurities, and reusing them in the vehicle's systems.

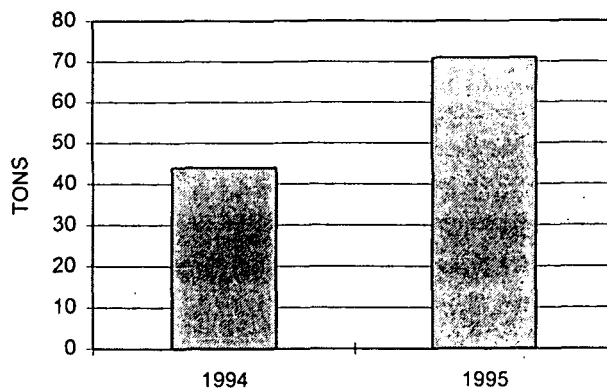
Waste Minimization has established a subcontract to recycle circuit boards and electronic scrap. The recycling program will begin in 1996.

**Table 2.0. Site-Wide Recycling Activities**

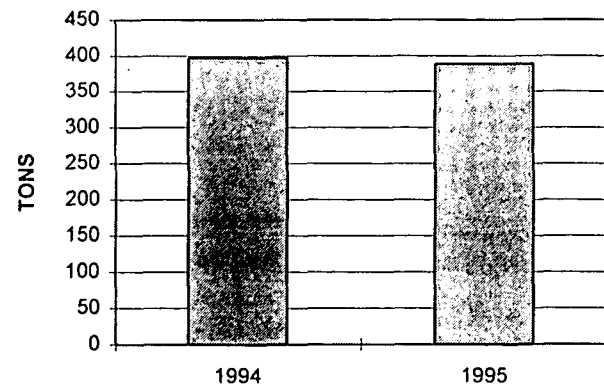
Material	1994	1995	Percentage Change
Office Paper	397 tons	389 tons	-2%
Cardboard	44 tons	71 tons	62%
Scrap Metals	511 tons	167 tons	-67%
Toner Cartridges	2,726 each	2,006 each	-26%
Lead/Acid Batteries	3 tons	11 tons	266%

(For further information see the following information on Materials Currently Recycling)

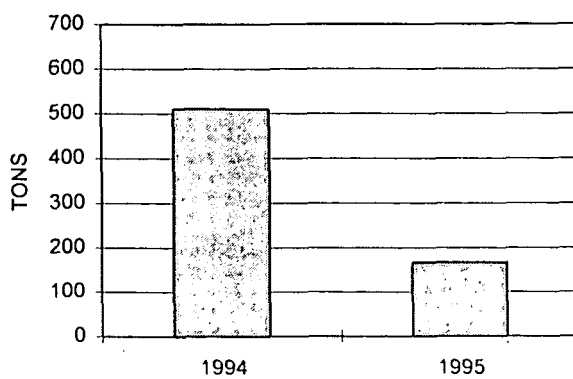
**CARDBOARD**



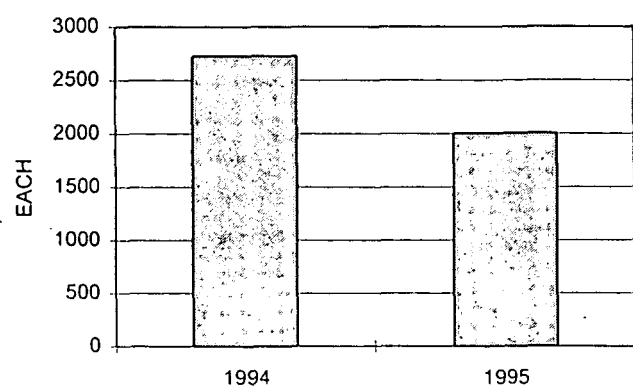
**PAPER**

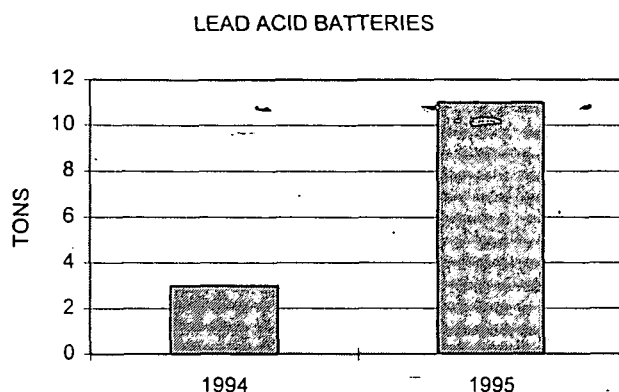


**SCRAP METALS**



**TONER CARTRIDGES**





### **Materials Currently Recycled:**

#### **Paper Products:**

The Site initiated office paper recycling in April, 1988 and has since recycled over 3.9 million pounds of paper. The amount of paper recycled has increased every year since inception until 1995 when the Site population decreased. Recycling of newsprint was initiated in 1995. The need arose when the Site newspaper changed to newsprint and other offsite newspaper subscriptions began to be received at the Site.

The cardboard recycling program was initiated during 1994 including the distribution of 40 special "CARDBOARD ONLY" dumpsters across the Site. Dumpsters are emptied into a compactor truck and delivered to an offsite recycler. The success of the program is attributable to the ease of its use

#### **Aluminum Cans:**

Aluminum can recycling is an employee-operated program. Individual employees remove cans from Site and collect proceeds from local recyclers. In many cases, employees donate the money to local charities. The Waste Minimization department facilitates this effort by providing recycling bins to be used exclusively for aluminum cans. They are placed in the cafeterias and by vending machines. Although data is not formally tracked, it is estimated up to 25,000 pounds are recycled annually.

### **Printer Toner Cartridges:**

In 1993 a contract was established with a local small business to refurbish used cartridges and provide them for resale to the Site. The Waste Minimization and Procurement departments have placed restrictions on the purchase of new toner cartridges when recycled cartridges are available. Since inception, 3,792 remanufactured cartridges of the total 7,103 cartridges sent for recycle have been purchased back from the refurbishing vendor.

### **Scrap Metals:**

A variety of scrap metals are segregated and collected from numerous operations. These include stainless steel turnings and solid scrap, aluminum, mild steel, copper, brass, and other metals determined to be scrap. The program is administered through the Property Utilization and Disposal department following DOE Property Management Regulations. Metals are dispositioned through a local recycler.

### **Batteries:**

Lead acid batteries are recycled through two different departments. The Vehicle Maintenance Department utilizes an exchange program with their battery supplier, exchanging an old battery for each new one purchased. All other lead acid batteries are accumulated by the Waste Disposal organization and are shipped periodically to a reclamation facility.

### **Lubricating Oils and Oil/Fuel Filters:**

Hydraulic oils and motor oils are collected and shipped offsite to be fuel blended and burned for energy recovery. The Vehicle Maintenance Department utilizes an oil/fuel filter recycling program where filters are drained and compacted prior to shipment to an approved recycler.

### **Silver Recovery:**

The Site's silver recovery programs encompass spent photographic and radiographic solutions, expired film, and radiographs. The monetary value of the recovered silver is used to offset the cost of subcontract services. Cost savings are realized by not having to manage the silver-bearing materials as hazardous waste and through the avoidance of rinse water treatment expenses.

Recycling waste photographic solutions, including fixer and bleach fixer, eliminated 420 gallons of potentially RCRA hazardous waste in 1995.

#### **Circuit Boards and Electronic Scrap:**

A subcontract for the recovery of metals from circuit boards and various electronic components has been established by the Waste Minimization organization. The contract allows for materials to be shipped to a reclamation facility for processing. The value of the precious metals recovered will be used to offset the cost of the contract. Recycling these materials will reduce the amount of RCRA hazardous waste that will need to be managed.

#### **New Technologies:**

A composting pilot project to reduce the volume of waste being shipped from the Site sewage treatment plant was completed in 1995. Two piles of sewage sludge were built for the project. Air was periodically pumped through a french drain within the piles and temperatures were monitored to maintain conditions for optimal decomposition of the material. Reduction ratios ranged from 0% to 39% for volatile solids and 37% to 56% of moisture. The results concluded that composting of raw sludge is a feasible alternative for stabilization and disposal of waste water sludge.

Fluorescent tubes manufactured by Philip Lighting Company utilizes a new technology which reduces mercury loss and have been evaluated by Waste Minimization. Instituting these fluorescent tubes will reduce the amount of RCRA hazardous waste generated along with reducing waste management costs. A program for implementing these fluorescent tubes is anticipated to be developed in 1996.

A charge back system has been developed to force the cost of waste management back to the generator. The system was tested using non-conforming waste containers requiring repackaging. The charge back system may be enhanced in 1996 to incorporate a larger scope of waste management costs.

The Site has begun to investigate the option of recycling radiological contaminated scrap metal during decontamination and decommissioning operations. Several subcontractors have been identified which will accept this metal for decontamination using a variety of technologies. Technologies include carbon dioxide cleaning techniques, surface decontamination, and reconfiguration into radioactive waste containers. The logistics of this program

are being explored to initiate and secure a contract to remove material from the Site.